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## THE THEORY OF DEVELOPMENT, AND ITS BEARING ON SCIENCE AND RELIGION.*

By J. W. JACKSON, Esq., F.A.S.L.

The theory of development *versus* special fiats of creation, is not new. Darwin is but its last expounder. It is strictly not the product of any one mind, though Lamarck is more especially chargeable with its origination; it is the natural and inevitable product of an age of science, that recognises law, and, by implication, denies miracle. The fundamental idea underlying this development *hypothesis*—for this is its true designation—is by no means confined to the animal and vegetable kingdoms. It covers the origin and existence of the material universe, and is coextensive with all its suns and systems. If animals come by law, so do worlds. If all things *grow*, and nothing is made, planets and their satellites are simply embryonic suns, still in the (celestial) womb of their solar parent. And if the earth has been covered with her beautiful Flora, and animated by her varied Fauna, without the special intervention of a Creator, then we may be sure that the stellar spaces are the sphere of advancing, though apparently incipient organisation, whereof suns are but the cosmic cellules. Few of the adherents, or perhaps even the leaders, of this school, would dare to follow out their premises to such a con-

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clusion; but such a failure on their part would be simply the result of a want of logic, or a want of courage.

Nor does the development hypothesis rest satisfied with an exposition of the past; it casts its gaze prophetically forwards into the future. Seeing the former in a state of unresting, though onward, transformation, it regards the latter as inevitably the sphere of a similar upward and onward movement in organisation. The forces which have produced the one result cannot fail to eventuate in the other; hence all existing species are regarded but as the transitory types of universal being. To this man is no exception. The product of law, he must ultimately become its victim; he began in time, he will end in it; mortality is predicable not only of individuals, but of types. Indeed, contemplated from the plane of nature, either of these facts implies the other.

Let us state this matter somewhat more explicitly. From the stand-point of law the material universe is regarded on the theistic basis, as a (necessary) emanation; the negative, that is material and temporal, pole, as contradistinguished from the positive, that is spiritual and eternal, pole of universal being. It is the sphere of effects as opposed to the sphere of causes. In a still profounder sense, it is the latter ultimated (into form) on the merely sensuous and phenomenal plane of perception. On the atheistic basis, it is regarded as so much self-subsistent and eternal material—subject matter for the operation of self-acting and invariable law—the expression of blind, unintelligent, and necessary force. It need scarcely be said that this latter is a self-contradictory scheme of baseless assumptions, whereof neither the logic nor metaphysics, the philosophy or the science, is worthy of serious consideration.

And now for the relation of the development hypothesis to Deity and his attributes. It does not, in the first place, imply his non-existence or his inaction; it simply defines the *mode* of his action in the process of (so-called) creation. It affirms this to have been one of *evolution*, or growth, in obedience to law, in place of a *making* in accordance with arbitrary volition. It does not deny the preexistence of divine ideas; it, on the contrary, in the mind of all its higher votaries, presupposes them, the process of development being simply the manner of their fulfilment. Now this manner, this mode of procedure, is in perfect accordance with all the organic processes of nature whereof we have experience. Nature knows nothing of miracle; she is utterly ignorant of all forces extraneous to herself.

And now for the relation of the development hypothesis to science. It is, in its present form, and with our existing knowledge of either past or present organic types, simply a convenient explanation of the undoubted fact of special diversity. There is not one tittle of *positive*

evidence to support it. It is possibly, and even probably, the right hypothesis, but that is all which can yet be justifiably said in its favour. It may be, and probably is, the true theory of organic being, but we yet wait for its *demonstration*. Upon this understanding, let us look at its probabilities, or perhaps, as its opponents would say, plausibilities. It excludes (needless) interference. It does not want a *deus ex machinâ* at every great turn of the celestial mechanism. As we have said, it disowns *miracle*. It does not ask for extraneous help—for foreign aid. It finds nature adequate to her own necessities. When she wants a type, she is able to provide it—a great recommendation to a man of science.

Now what *are* the vegetable and animal kingdoms? that is, what position do they hold, and what function do they discharge, in the economy of the earth—the only cosmic cellule, be it observed, with which we are at all intimately acquainted, but whose conditions we have no reason to believe exceptional. They are obviously its *organs*, in so far as such matters are susceptible of illustration by comparison, or, shall we rather say, analogy; the former for the discharge of its vascular, and the latter its muscular functions. But without insisting on the correctness of this minutiæ of explanation, to which, as we are well aware, (captious) objections may be readily taken, we will here content ourselves with simply affirming that vegetables and animals are obviously telluric organs. Now this, of course, implies not only that they are harmonious parts of the telluric organism, but that they are all thrown up like the teeth or beard of a human subject, at certain stages of its total or, shall we say, cosmic development, as the befitting and needful instrumentalities through which some of its more important and higher vital duties are effectively discharged. The moment this idea is fully realised, all thought of accidental evolution or arbitrary creation ceases. They could not be other than they are, whether as to time and place, or form and function, without a derangement of the normal condition of things, bordering on monstrosity.

This idea that vegetables and animals are organisms of the earth, of course implies that the latter is also a (cosmic) organism, in a state of (probably embryonic) growth. And if so, then these organs are no doubt adequate indications of its age and condition, had we the knowledge requisite for their interpretation. Here, then, we see the great importance of MAN, whose appearance on the telluric stage, must have synchronised with the emergence of the earth into its intellectual condition. In other words, speaking anatomically and physiologically, he represents its nervous system.

And now let us make a few remarks on man and his place in

nature, present and prospective. He is the culminating point of all existing organic life. He is the crown and glory of the animal kingdom—that to which, in a sense, all its types tend, and of which they are the embryonic incompleteness. It is here, indeed, at this stage of the inquiry that we obtain the fundamental idea, the radical conception of what the animal kingdom really is. It is, then, simply an ascending series of embryonic forms arrested at the successive stages of their development. ONE Divine idea underlies the whole, and their diversity arises from the varying degree in which they approach the bourne whither, in a sense, they all tend.

And now we seem to hear one consentient chorus of objection and denial, implying that if this be true, man must necessarily be *one* with the monkey, the bear, the frog, and the worm. But this would be a grave mistake; (remote) community of origin by no means implies congruity of character and identity of endowment, any more than similarity in organisation. The gradual evolution of species, genera, orders, classes, and kingdoms, constitutes an important part of the development programme. Hence it no more follows that man is one with the anthropoid apes because they were his more immediate progenitors, than that he is one with the frogs or the worms, because they were his ancestors at a remove somewhat more remote. All nature is one contemplated synthetically. She is multiple regarded analytically. All depends on the standpoint of the observer. Contemplated, then, from the plane of science and theosophy, the development hypothesis is possible and probable. It simply expresses the manner in which the Divine idea of creation has been fulfilled. It describes and defines the process of evolution, whereby, under the conditions of time and space, the infinite and the spiritual have been made presentable as the finite and material. But as apprehended by many of its present scientific adherents, that is a practically atheistic scheme, in which blind force is regarded as the source of beauty and order, of harmony and intelligence, it is thoroughly illogical and altogether unsatisfactory. As expressive of God's mode of working through natural law on the material plane, it is the most plausible explanation of processes and results yet propounded. But take God —that is, preexisting intelligence and will—out of the problem, and its solution becomes at once impossible. But to see this our men of science must be also logicians and metaphysicians, and to ask such qualifications in addition to their other high attainments, is perhaps to make an unfair demand upon ordinary human intelligence.

Let us now contemplate the development hypothesis in relation to (revealed) religion and the (supposed) facts of the Bible narrative. And here let us, *in limine*, protest against the principle of limiting

scientific investigation by the data of a dogmatic theology. The laws of nature have nothing to do with creeds. Science appeals to facts, not to authorities. From the anthropological standpoint, religions are simply historical phenomena, holding a certain relation to the successive stages of civilisation with which they are cotemporary, and of which they constitute a very important and salient feature. Science does not believe in the eternal duration of anything except principles. It regards all forms, even those of religion, as essentially mutable and mortal. They were born in time, and they will die in time. And this opens the great question, "Is revelation a miracle?" to which we unhesitatingly reply in the negative. Successive revelations are, even on the strictest interpretation of the Bible hypothesis, a part and parcel of the providential history of mankind. The Adamic, the Noachian, the Patriarchal, the Mosaic, and the Christian dispensations, are adequate proofs that Semitic theology comports with a gradual development of the religious idea. It is from their bigoted opposition to this element of *growth* that the Jews are the wrecks we see, stranded waifs on the sands of time, left high and dry by a tide that has swept past them laden with the priceless argosy of Christianity. But is existing Christianity final? Most assuredly not. Its Founder expressly taught the advent, first of the Comforter and them of Himself, or, in other words, of a second Messiah, for it need scarcely be said that on the spiritual plane personal identity is not corporeal. But are we right in thus limiting our views of revelation to biblical examples only? Does not such a procedure partake of the narrowness and exclusiveness of Jewish bigotry? In short, were there not *Gentile* revelations—the side branches, though not the main stem of the mystic *Ygdrasil*, the theological tree of life? Suffice it, then, that we regard revelation, or the spiritual intuitions of ecstatic seerdom, as a normal product of the human mind at certain stages, or rather crises, of its development, as normal, and therefore in a sense as natural as the *Iliad* of Homer or the *Hamlet* of Shakespeare.

No logician can fail to see that such a conception of revelation involves the idea of its *relative* perfection only. Were this perfection *absolute* it would be also *eternal*, whereas all revelations hitherto have been for a special time, place, and people. We are aware that Christians claim more than this for their scheme; but the authority of the Master is against them. He expressly limited it in time, and prophetically foretold its suppression by another system to be inaugurated by himself at his second advent. "I have many things to say unto you, but ye cannot hear them now," are not the words of a *final* teacher, but rather of one who feels that at *present* he is but the precursor of *himself*—or another.

Holding such views of revelation, it is no wonder that we regard its *quasi* scientific teachings with indifference. Its cosmogony is simply a traditional myth; its astronomy and geology are beneath the serious examination of modern science; and its anthropology will be regarded as equally baseless, whenever this—the latest of the sciences—shall have won for itself the same honourable recognition which has been accorded to other and older departments of inquiry. These are bold assertions. They sound very much like freethought, but they nevertheless express "the creed of Christendom." No one believes now in either the astronomy or the geology of the Bible; why, then, as we have said, cling to its anthropology? No one now adheres to the literal six days of creation; why, then, cling to the literal Adam and Eve. But it has been said Christ took on himself the form of man; it must therefore be eternal, a fleshly tabernacle moulded upon a divine idea.* To which we reply, that it was a temporal vesture assumed for a special purpose, and underwent transfiguration on the Mount, and transformation, or shall we say glorification, after his death. It was, then, a magnetic or, as some would phrase it, a spiritual body—luminous, imponderable, and susceptible of interpenetration by grosser matter. He could be visible or invisible at pleasure; he could enter a room with closed doors, and he could finally ascend in it to the highest heavens. Nothing more clearly demonstrates the sensuous grossness of popular Christianity than the vulgar belief that it is a common fleshly body through which the eternal Messiah is manifested in the celestial mansions. Do the people who entertain this belief know that spiritual beings must have spiritual modes of perception, and that a simply material body would

* "What next is the Christian theory of incarnation? That we had a father in the flesh, the first Adam; that the Son of God, to redeem us, took upon Him, in the fulness of time, our nature, and became man as the second Adam. This Christian theory further assumes, that not only did the men redeemed by Christ all spring from a common ancestor, but their human nature is to be perpetuated for ever in the future world. Christianity holds that the second Adam will wear our nature in heaven for ever. The consequence is, that the nature of man is a fixed thing, no piece of evanescence. It began with the first Adam, the direct creation of God, and it shall be perpetuated through eternity; the glorified second Adam being the centre point, or point of fixation, for human nature for ever. Now is it not evident that, as two and three cannot make four, so neither can the development theory and the tenets of the incarnation hang together? Is it not now manifest to the dullest intellect among my readers, that no philosopher of any kind can pretend to hold these two things in conjunction." (From fourth letter of Mr. Gillespie to the Rev. George Gilfillan, on *The Doctrine of the Incarnation, and the Theory of the Modern Anthropology Irreconcilable*, p. 20-21.)

be quite as much out of place—that is, out of harmony with its surroundings—in heaven, as a purely spiritual body would be on earth; that it would, in all probability, be, under ordinary circumstances, as imperceptible and as inefficient as its spiritual counterpart here. Every *mode* of being has its own *sphere*, and as purely spiritual manifestations are, to say the least of them, rather exceptional here, we may conclude that simply corporeal manifestations are equally exceptional there. To put this in clear and unmistakeable language, as the Christ required a corporeal vesture for his earthly mission, he must equally require a spiritual vesture for his heavenly mission; as he became a fleshly man below, we may assume that he has become a spiritual man above, returning not merely to his heavenly home, but to his celestial conditions.

Granting then for the sake of argument, that the assumption of the human form by Christ, was indicative of its perfection and finality in the scheme of creation, it is obvious that we should not rest satisfied with the opaque and ponderable man of the present, but advance in our conceptions, to the radiant and magnetic man of the future, the *transfigured* successor of the present child of sin and sorrow. If Christ was our brother in his humiliation, he was also our precursor in his glorification. What he was, we are. What he is, we shall be. There is no escape from this logic, and it covers the next great advance in organisation, the assumption by man of his true position, as the aerial and, if we may so say, papilio type of the mammalia. This demands explanation, and brings us back from theology to science, for the purpose of yet more accurately defining man's present and prospective place in the scale of being.

We have already spoken of the various types, that is Species, Genera, Orders, etc., of the animal kingdom, as the successive phases of one grand embryonic development, whereof man is the most advanced existing instance, that in which the fundamental idea of a sentient organism attains most nearly to perfection; in other words, he is *absolutely* the most matured type of organic life on the globe, while yet *relatively* he is one of the most immature. All this needs explanation. If we contemplate the great scheme of organic life on the sentient plane in its bipolar relationship to the ponderable and imponderable elements of the universe, we shall soon discover a duplex arrangement of its grander provinces, in perfect correspondence with this established division of its circumambient forces. The grub and the butterfly, the reptile and the bird, the quadrupedal mammal and bipedal man. The one terrestrial, the other aërial in its character and proclivities, in its organisation and equipments; the first emphatically embryonic, the last comparatively mature and finished, *on its own*

*especial plane.* In the lowest type, the individual worm is found susceptible of transformation into the glorious papilio, the thing of dirt and slime, rising into the creature of beauty and splendour. In the next grade, from the greater complexity and specialisation of the type, this individual transformation (which however is in reality nothing more than normal embryonic development transacted externally and visibly) becomes impossible, and the reptile only emerges into the bird by a change of order.

We may now understand why the mammalia, although occupying a far higher position than that of the bird, are yet inferior to it in respiration and locomotion, and even in that phase of intellectual capacity which is manifested in music. They are but the lower and terrestrial division of their (mammalian) type. Hence they are *wingless*, and not only of the earth earthy in their manner of locomotion, but even in their structure and the attitudes which it necessitates. They are *quadrupedal*, each of their extremities being used solely for locomotion, and as a result, they are *prone* in posture, *parallel* to the earth along their great spinal axis, like the reptiles, to whom their long *serpentine* tail also indicates their relationship of correspondence. Their inferiority to the bird is also manifested in this want of all *specialisation* in their extremities; they have *four* feet, while their aërial predecessor has *two* wings and *two* feet.

Between these prone and quadrupedal mammals and bipedal man we find the *transitional*, and no doubt *perishing* link of the quadrumana, the fourhanded and still imperfectly specialised monkeys, advancing through tailless baboons, and culminating in the anthropoid apes, between whose structure and that of man there are so many points of resemblance, and yet between whose mental endowments and those of humanity there is nevertheless so vast a difference. We fear indeed that this subject is still but imperfectly understood either by the supporters or the opponents of the theory of development. The former dwell with especial force on resemblances, while the latter are equally prone to emphasise differences, and thus, as in the story of the chameleon, both are right and yet both are wrong. Thus, Professor Huxley and his pupils, ignoring those facts in cerebral physiology which attach to specialisation of function in the brain, affect to see little or no inferiority in that of the gorilla to that of man, despite the fourfold magnitude and immeasurably more complex convolutions of the latter. They dwell on basilar similarities and slight coronal diversities; they are great on the instrumentalities for prehension and locomotion, and weak on those which are conducive to a manifestation of thought and principle—a procedure whereof we may safely leave the adjudgment to a more enlightened posterity. But if

some of the more ardent advocates of development, in their zeal for maintaining unbroken continuity, are thus prone to overlook or underestimate diversities, there is no doubt its opponents are equally prone to exaggerate them. It is not indeed until we have fully mastered the idea that man, though originating in the quadrupedal mammalia and transmitted through the quadrumana, is nevertheless the initial type of the new order, that we become capable of fully harmonising the fact of his "ape ancestry" with that of his undeniable moral and intellectual superiority to his brute progenitors. As the germ of a new order, his earlier types would be merely provisional, that is transitional, and so transitory. Nature would be desirous, if we may so phrase it, to emphasise and widen the gulf between him and his inferiors—a process still advancing, and yet far from its predestined completeness; the gradual extinction of the highest quadrumana and the rudest races of men, to the extent probably of the disappearance of anthropoids on the one hand and savages on the other, being obviously a mere question of historic time and circumstance.

While on this subject we may remark, that the diversity between man and the ape doubtless affords adequate data for at least an approximate admeasurement of the age of the former. To even the attempted solution of this problem we are, however, as yet quite incompetent. We have not settled even the width of the gulf, and we are utterly ignorant of the rate of change whereof it is the summation.

The development of the especially human type of organic and sentient existence, consisting fundamentally in a gradually advancing centralisation of the nervous system, and in a corresponding specialisation of structure and function, more especially in the cerebral convolutions, has probably, even in the highest races, not yet fully wrought itself out into external manifestation—that is, has not yet produced its full effect upon the proportion and disposition of the viscera, and on the configuration and arrangement of the limbs and torso, to say nothing of the form of the features and the general physiognomical character and expression of the countenance; in other words, the difference between man and the gorilla s much greater in brain and character than in merely corporeal form and function. The same remark applies indeed with equal force to the various racial types of man himself, the difference in mental endowment between an Australian aborigine and a European settler, being but faintly reflected to an ordinary observer in their general build and colour, though somewhat more perceptible to a competent phrenologist in their cranial contour and temperament. It is the same as between the various castes and even individualities of any one race or nation, whose inner and real, that is psychological diversity, is so imperfectly

represented in their structure, that it demands the trained eye and practised hand of an experienced manipulator to even remotely admeasure the diversities of thought and feeling by which they are nevertheless unmistakably characterised.

And now then, perhaps, we are somewhat prepared to estimate the true position and the relative development of man. He is the beginning of a new *Order*, the bipedal and aërial type of the mammal. But of this, he is, as we have said, obviously an immature, and merely germal specimen. His vascular arrangements are far too powerful in proportion to his muscular, and his alimentary functions are far too potent in proportion to his respiration, for a purely aërial type; the direction, however, in which he is moving is clear. The Negro is predominantly vascular, the Turanian muscular, and the Caucasian nervous in temperament; in other words, man in his higher types is less allied to the ponderable and more intimately related to the imponderable elements than in the lower. He is obviously in the process of emergence, and the only question remaining for discussion is, the stage of development at which he has now arrived.

We have said that man is still immature. Let us now proceed to prove the truth of this assertion. And first, as to his condition at birth, when he is confessedly helpless beyond almost any other creature. So incapable indeed is the baby, that during the earlier months of its existence, the duties of the mother become almost those of a marsupial, her arms being a *quasi* pouch, in which her corporeally and mentally feeble offspring is carried and protected for the first year of its faintly dawning powers. This fact alone is decisive of the question at issue, with judges competent to estimate its significance. To give the unscientific reader, however, some idea of its importance, we may mention that among birds, the young of the *Gallinæ* (hens, pheasants, etc.) can run and eat as soon as they are hatched, and, although not fully fledged, are nevertheless well covered with small feathers; while the young of the *Raptores* (eagles, hawks, etc.) that prey upon them, and are known to be more recent, are born callow, must be fed by their parents, and need the protection of the nest, not only for days but even for weeks after they are hatched. So among mammals, the young of the *Ruminantia* (ox, deer, sheep, etc.) can stand, see, and walk some distance, a few hours after birth; while the young of the *Felidæ* (lion, cat, etc.), or the *Canidæ* (wolf, dog, etc.) are blind and feeble for many days after birth, and demand the most careful maternal attention for many months. But as we have said, it is needless to multiply examples for the competent, while to accumulate them for the incompetent would be useless. Suffice that the principle is admitted, and that man is a notable instance in point.

But man is not only born callow and furless, but he remains so, more especially among the lower races, who are nearly beardless. Yet here again the direction of the line of movement cannot be mistaken. The Negro has no true hair at all; the Turanian has little, except on his head; while the robust and high caste male Caucasian, has not only a flowing beard, but also a hairy chest (the promise of his lion's mane), and is otherwise more or less hirsute over the larger part of his person. It is obvious that nature does not intend him to remain for ever naked. At the next great *racial* development of humanity we may be perfectly certain there will be an increase of vesture, and this, too, at some removes before the *radiant* man is produced.

But the distinctive feature of man as compared with the inferior mammals is in his mental endowments, or speaking anatomically and physiologically, in the development of his nervous system, more especially in the superior portion of the cerebral hemispheres. He was obviously intended to be a perfectly rational and morally responsible creature, a being in whom the animal instincts and passional impulses are to be subjected to the restraints of principle and the direction of intellect; as such, his emergence marks an epoch in telluric development, of which, probably, even the most advanced minds can form no adequate conception. Suffice it that through him earth has now a perpetually divine incarnation, a living consciousness of relationship to the celestial. Through him, as a God-appointed priest, her hills and valleys become vocal with prayer and praise,—creation thus, for the first time, in this telluric sphere, attaining to the possibility of a rational recognition and worship of her creator. Such is man, were the plan on which he is obviously constituted carried out to its appropriate fulfilment. Through the purity and elevation of his moral principles, he is related to the heavenly. Through his higher intellectual faculties, which give him the power of *abstract* thought, he rises above the tyrannical domination of the temporal and phenomenal, and lays hold on the eternal and unchangeable. In him, as we have said, the divine element, which underlies all creation, wakes up into consciousness, and Nature knows herself to be, not a senseless automaton, the mere *mechanism* of her Creator, but his spiritual bride, *vestured* with but not wholly composed of matter, a glorious spirit, draped with suns and crowned with stars, which are however, even at their best, but the casket to the gem—her interior consciousness of a divine life, with all its present dignity and yet sublimer promises, and their assured fulfilment.

Now it is only necessary to place the poor reality of actual manhood beside this picture of the design on which it is modelled, to see

that the result, thus far realised, is a miserable failure. Man, universally in the lower races, and among all commonplace individualities in the higher, is largely instinctive and passional, and very imperfectly under the control of his moral nature; while among all, save a few exceptionally endowed men of genius, the human intellect is still largely on the perceptive, that is phenomenal plane, from which it either never, or only at rare intervals, rises to the sphere of eternal law. Its habitual dwelling is with perishing facts, while it is comparatively, if not wholly, a stranger to immortal principles. But in addition to these high endowments, man was obviously intended to be creative, or if a more accurately definitive term be preferred, recreative. He is the embryo poet and artist; in truth, this is his noblest, because his most nearly godlike function, to evoke order out of chaos, harmony out of discord, and beauty out of deformity. It need scarcely be said to any matured student of theosophy, that he could only do this, or even remotely approach to the doing of it, in virtue of the divinity that is within him. But how few men in any generation are capaple of this! How few and far between are the burning lords of song, or the deathless framers of beauty, on whose immortal productions the ages have set their seal!

*Man*, then, as he at present exists, is NOT a fulfilment of the divine idea of humanity. He is simply a providential preparation for it. So profoundly was this deep truth felt by the seers and sages of old, that they invented the myth of the fall to account for the lamentable discrepancy which obviously exists between the actual and the ideal man, between the Adamic Son of God in the unsullied perfection of his purity and the undimmed splendour of his powers, and that miserable abortion which meets us in the streets and insults us on the highways of ordinary life. From the standpoint of science, which means *fact*, contemplated *rationally*, that is through the *higher* reason, the aforesaid myth is simply an *inversion*. On the temporal plane, man has not fallen *from* but is rising *to* Adamic perfection. His real fall was and is spiritual, namely, his descent by ordinary birth, out of the eternal into the temporal sphere, out of the spiritual into the material (corporeal) plane of being.

From the foregoing (and were there space, we might enter into yet other aspects of the subject), it must be obvious that man, as he at present exists, is not the fulfilment of a divine idea, but only the *preparation* for it. Like every other creature that has yet appeared on the earth, he constitutes a grade in the scale of being, superior to those which preceded him, but doubtless inferior to those which are to succeed him. As already remarked, he holds a peculiar position, not only as the initial type of a new Order, but from the fact that

that Order is itself contradistinguished from every other by the very important endowments of rationality and moral principle. Hence some writers, like Mr. Burke, have not hesitated to speak of him as the initial type of a new *kingdom*, as distinctly separated from the animal as the latter from the vegetable. But even such writers regard him as *initial*, not *final*.

And what a stupendous vista of progress and possibility is thus opened to our wondering gaze! Man but the unfledged *beginning* of a new Order of being, the callow nestling of the future eagle of the skies; the precursor, and in a sense the progenitor, of earth's manifold types of intelligent being. We use this term *manifold* advisedly. If man be indeed but the initial type of a new Order of being, then, according to our experience of the ways of Nature in all her other provinces, that Order must ultimately develope out into as many genera and species as the one beneath it, and of which it is, in a sense, the celestial or aërial counterpart. This is so as between grubs and butterflies, reptiles and birds, and we can see no sufficient reason why it should be otherwise as between quadrupedal and instinctive mammals and their more effectually specialised and bipedal superiors of the intellectual Order. Thus contemplated, then, we also see that existing man is not the divine idea of humanity in its final form, but only that idea in the process of realisation.

To this conclusion we are also brought by returning to the grander view of his telluric relations, as a vital organ of the earth. This planet, on the development hypothesis, is simply an embryo sun. As such it must be at the least infantile, if not still virtually embryonic in the grade of its development; and if so, then its organs, more especially such an one as we are now considering, cannot fail to present many signs of imperfection and immaturity. Thus contemplated, man, as the initial type of a new Order, correspondent to the nervous, and more especially the cerebral structure, is obviously *germal*.

We have spoken of the earth—man's material habitat—as still infantile, if not embryonic. It is attached to its solar parent, and fed, like any other embryo or suckling, from the parental fount. It is only one of a large brood, and from position most obviously neither the oldest nor the youngest. It is far inferior in complexity of organisation and multiplicity of attachments to Jupiter, Saturn, Uranus, or Neptune. It is still unvestured, and obviously in every way at a long remove from its majority. Now a cosmic cellule so decidedly immature, cannot possibly be the residence of the highest type of organic being. The radiant man will probably need a self-luminous domicile. Everything indicates that suns are the only

appropriate habitat of the mature forms of organic life, they being the only mature cosmic organisms known to us. Planetary life being dependent upon, and, as we have said, probably derivative from them, can only be the appropriate habitat of preparatory forms of life as immature and embryonic as that of the planet on which they reside. Hence the fitness of that arrangement to which we have already alluded, namely the essentially embryonic character of all terrestrial organisms,—that of man, though the most nearly mature (in absolute type, yet one of the most immature in relation to his own order), not excepted.

Thus, then, on the plane of science, we can have no doubt that man is far from manifesting the highest possible type of organic existence. He is only the highest of telluric organisms possible in the *present* condition of the earth. Of the *range* of diversity over which his future species and genera will extend, we may form some remote conception by considering that of insects and birds, as compared with the corresponding range of grubs and reptiles. From this it becomes at once obvious that the aerial type has immeasurably the larger arc of variation, so that we seem justified in concluding that the existing diversity among quadrupedal mammals is as nothing compared with the much greater diversity of type yet to be developed among their bipedal counterparts. It is only, indeed, among the latter that we can expect to find the grander correspondences of the animate scale completed. This perhaps needs some explanation.

As already remarked, the universe is a UNITY, like its divine Author, of whom indeed—with all reverence be it spoken—it is, in a sense, the material reflection cast on the expanse of space under the conditions of time. Hence one fundamental idea runs through all its organisms, repeated and varied however in a thousand ways—a very Proteus, ever the same yet always different. Thus, for example, the genera of birds are repeated in those of beasts. Thus the *felidæ* correspond to the *raptores*, the *canidæ* to the *corvidæ*, the *gallinæ* to the *ruminantia*, etc. Now it has long been remarked by our profounder naturalists that the bestial genera are wanting in many species and varieties which exist in those of birds. Thus, for instance, the *felidæ* are all nocturnal in their habits, and, with the exception of the lion, who is perhaps, after all, but a white owl, correspond not to the magnificent *diurnal raptores*, the eagles, etc., but to their nocturnal congeners, the owls, to whom, with the aforesaid exception, they are also allied by their spots and stripes. So also the *canidæ*, notwithstanding the great variety of the domestic dog, are immeasurably inferior in diversity to the *corvidæ*, who range from the common black crow to the magnificent bird-of-paradise. Now, it is

probable, nay almost scientifically certain, that the animate scale is not yet completed on the plane of the quadrupedal mammals, among whom, however, as a merely terrestrial order, it would be absurd to look for the effective reproduction of typal correspondences, existing only in the aerial order of the duplex grade below them. For such an effective reproduction we must wait till their superior grade has also been fully developed into its aerial types, which we may be sure will quite equal, both in diversity and beauty, the grandest species of the aerial orders beneath it.

We are fully aware that in the foregoing remarks we have, both in our illustrations and reasonings, so far transcended the ordinary range of scientific research and thought, that the general reader can scarcely be expected to follow such gossamer speculations to their far-reaching and somewhat startling conclusions. For his benefit, then, we subjoin a few general reflections on this subject, for the full appreciation of which no especial scientific attainments or philosophic studies are demanded as a needful preparation. We have said that the universe is a grand unity under one aspect, and we may add, that it presents an exhaustless diversity under another. If it did not do so, it would be unworthy of its Divine Author, would fail to be what it is in the process of becoming, the reflection of his thought, the material symbol of himself. Now this diversity in unity is already so far realised in the mineral, vegetable, and animal kingdoms, as to afford us, even from our limited experience on this contracted telluric area, some faint conception of the vast, nay, the *absolutely infinite*, resources of this celestial artist. Now, whether from increasing pliability of material, or perhaps, more correctly, the increasing susceptibility of their ponderable elements to the action of the imponderable forces (which are not only the motor, but the plastic powers of nature), it would seem that, allowing for inferiority in ethnic age and maturity, on the part of the higher orders, the range of diversity, the arc of variation, increases as we ascend in the scale of being. Thus vegetables are more varied than minerals, and animals present a greater diversity of structure and function than vegetables. Now this being so, is it to be supposed that in the highest of all the types of organic being yet manifested on the earth, namely, in thoroughly specialised, bipedal, rational, and moral man, the Creator will permanently fail to leave the full impress of his infinitely artistic power, in the production of that pleasing, because *harmonic*, diversity, which we see already so far advanced among the inferior grades of organic existence? We have used this term HARMONIC advisedly. Let us clearly understand that, in the works of this truly divine Orpheus, there are no *real*, but only *apparent*, discords. The pealing anthems of the morning stars of

creation may present some tremendous, and, indeed, almost deafening crashes, if you be too near the orchestra; but get to the proper distance, and they will all melt into the sweetest symphonies and sublimest marches, the faultless music of the spheres of heaven.

From the general tenor of the foregoing remarks, it will be at once understood, that we do not regard the development hypothesis as in any respect dangerous either to religion or morals. It has, in truth, no more to do with either the one or the other than the Copernican system of astronomy, or the Newtonian theory of gravitation. It is simply a question of science, not of theology. Atheists and theists may equally hold it; the latter rationally, the former irrationally. It is a mere figment of the theological imagination, that it leads to atheism. It stands aloof, as all purely scientific questions do, from doctrine. Whether it be true or false, has to be tested by facts, not dogmas; the matter awaiting decision being its congruity, not with the latter but the former. It would be premature to prognosticate its fortunes. It is more nearly possible now than when proclaimed by Lamarck, because many admitted breaks in the scale of our then known flora and fauna, have been since supplied through the fossil remains revealed by geology, and we may add geographical discovery. It is also more probable, as we now know, that the simpler organisms, as a rule, preceded the more complex, nature steadily advancing through the lapse of time in the specialisation of her types. Evidence is continually accumulating in its favour. Objections to its reception are being gradually removed. Darwin has demonstrated that the real *saltus* from lower to higher takes place, not so much in the organism of the parent, as in the process of generation. While, in his remarks on "the struggle for existence", he has shewn conclusively how the weaker and less adapted types are disposed of and extinguished.

The controversy has, indeed, advanced to such a stage, that it is really of very little importance whether the literal *development* hypothesis be established or not. All the leading facts on which it was based are now admitted; and the only question of importance still waiting decision is, the direct intervention of the Creator in the process of evolution. That the organic world began in germal simplicity, and has advanced by degrees to complexity of structure and specialisation of function, cannot be denied. All that we want to know is, the process by which this was accomplished. And when this principle of gradual evolution in the past, whether by all-pervading law or by a succession of creative fiats, has been admitted, it is simply an unwarranted assumption to assert that it has now ceased. On either hypothesis, we have no reason to suppose that this is less the day of creation than at any former period. There is nothing in either the

telluric or cosmic arrangements around us to indicate a cessation in any of the great processes, which have been in operation for thousands or even millions of years. As regards man, more especially, his indications are rather of acceleration than retardation. Never before did savage races disappear so rapidly as at present; a fact not slightly premonitory of the early appearance of higher types. Our entire experience of nature indicates that one end of the scale could not thus suffer without compensation at the other. It is the same with the larger types of her wild fauna, the lions, leopards, elephants, and tapirs of our vaster spaces of forest. These creatures merely await the reclamation of the wilderness to disappear. And are we to suppose that they will have no successors? Is there anything to indicate that nature is becoming impoverished in the wealth of her forms? in her plastic power over ponderable matter? On the contrary, everything indicates the very reverse of this; for, as the formative power of the mother over her offspring is in proportion to the development of her own nervous system, the mothers, human and brute, of to-day, are far more potent for the production of modified types, than the maternal element of previous geologic eras.

Once more we fall back upon the fundamental idea underlying this whole subject, namely, the earth as a living and growing cosmic organism, and her flora and fauna as specialised organs, for the more effectual discharge of particular functions. Of this, the races and nations of men are a most important department; in truth, as yet the most important. Nor must we, in such a connection, omit their constituent castes and individualities. A glance at society, as it exists in any civilised community, and more especially the complex communities of modern times, may suffice to convince any competent observer that humanity has in it all the elements needed for a stupendous expansion. The range from a dolt to a man of genius —from a porter to a poet—from a peasant to a philosopher, is such as exists in no other species, probably in no other genus. Again, all our experiences of nature, and, we may add, all our knowledge of the congruity ever *finally* established between the inner and the outer, the spiritual and the material, indicate that such discrepancies in mind must conclude in fully proportionate discrepancies of body. While humanity as a whole is *germal*, its special developments will of necessity be imperfect. As a collective organism, it is yet only in the process of specialisation. Most of its members are yet rudimentary. Like all other telluric productions, man, whether contemplated individually or collectively, is still embryonic, his social and organic conditions holding a most profound relation to each other. It is on this account that Negro society is simpler in its structure than that

of the Turanian race, while the social arrangements of the latter are less complex than those of Caucasian nations. But it is time we should conclude. The subject, as the reader may see, is yet far from being exhausted. It is too new and too grand, indeed, for any one man, or any generation of men, to exhaust. The evolution of organic existence involves the entire process of creation; nature herself—that is, the material universe—being but an embryo in the womb of chaos.

We have been led into these reflections by the prevalent tone of religious publications on the subject of anthropology and development, but more especially by a perusal of the *brochure* whose title appears at the head of the present paper. The author has been long and favourably known to the world of metaphysics and theology by his "*à priori* argument for the necessary existence and moral attributes of God," a work in which he manifests an ability for abstract reasoning together with a logical vigour and precision of thought which have unfortunately become somewhat rare in these latter ages of *à posteriori* fact and induction. These letters, then, of Scotland's greatest living dialectician to her most eminent literary divine, are not without significance as indications of the general tone of feeling on the science of man throughout North Britain. Perhaps the following abstract, which forms the conclusion of the introduction, will give our southern readers a clearer idea of the kind and degree of opposition to which anthropology is exposed in Scotland, than anything which we could pen in the way of description:—

"One thing gives me unbounded satisfaction, the reflection, to wit, that as the Rev. George Gilfillan was the first, so he will likely be the last clergyman in Great Britain, who shall, without renouncing his connection with a Christian church, advocate or apologise for the hypothesis adverted to. I mean, of course, the hypothesis which draws one continuous or uninterrupted line—a line, however, always increasing in volume, as it advances through the ages and millions of ages, like the widening of an isosceles triangle proceeding from its apex or vortex—a line, I say, perfectly continuous, with old Father Monad at one end, in the guise of some very simple cell-vessel, or as one of your unaccountable vibrios perhaps; and with man, man *so infinite in faculty*, at the other end. Only conditionally, however, as man is to disappear, to give place to his successor in the line of continuity, and be replaced by some flying creature, bearing a relation to man, like that which the beautiful butterfly, disporting in the beams of the sun, bears to the ugly caterpillar which crawls on the under side of yonder cabbage-blade. Yes, Mr. Gilfillan, as he is the first of the series of Developed Divines (a new sort of D.D.), so he will be the last. The whole line will happily be concentrated in

himself. And it is well for large numbers among our masses of church-goers that the evil should be so early stopped,—that, in fine, it has been nipped in the very bud. Had the folly increased, and run the round of the pulpits occupied by men anxious to show how they are quite on a level with the highest science of the day, the consequences to the unhappy hebdomadal audiences—(too often, like droves of silly sheep, too ready to meekly follow the shepherds)—the consequences might have been most dismally calamitous. In virtue of a see-saw in the development, we might have had a coming generation of reverted creatures, with ever more of the theftuous ape, or lecherous baboon—more of monkeyish cunning, at any rate,—and less and less of the man."

It would thus seem that untrammelled freedom of inquiry as to the origin of man or his place in the scheme of creation, is regarded as forbidden to the ministers, and by implication, therefore, we presume, to the elders and office-bearers of all the Scottish churches still within the pale of orthodoxy. What response they may afford to this demand on their unquestioning obedience we are not prepared to say. Suffice it, that while such ideas are generally prevalent, even among highly-educated and otherwise liberal-minded laymen, it is impossible for their clergy to enjoy that freedom of thought and manly liberty of utterance, which would seem of right the appanage of the scholar and the gentleman.

But not to do injustice to our northern friends, who with that *thoroughness* which is one of their noblest characteristics, deeming anthropological studies, when pursued independently of biblical authority, a source of error, do not hesitate to say so, with a directness from which we softer "Southrons" should perhaps weakly shrink—not, we say, to be too severe upon them as if especial offenders, it must be admitted that there is just now, both north and south of the Border, a decided set of the theological current against anthropology and the hypothesis of development, which, by a strange conglomeration of ideas are apparently regarded as identical. That there are anthropologists who do not believe in development, and advocates of development not especially prone to the study of anthropology—that, in point of fact, the great majority of anthropologists regard any formal inquiry into the *origin* of man as still premature, is even unknown to the outside public and to our theological critics among them. But letting this pass, we may remark that this theological opposition need give us no serious concern. It is nothing new in the history of science. Once it was astronomy, then it was geology, and now it is anthropology which is considered so especially dangerous and objectionable. But we need not fear; time will do for it what it has already accomplished for older and now less reprehensible

branches of investigation, and then it will excite no more doubt as to a clergyman's orthodoxy to find that he admits the possibly remote origin of man by a law of nature, than that he believes the sun to be the centre of the solar system.

## THE STRUGGLE OF MAN WITH NATURE.*

An English naturalist, Darwin, has attempted to explain in a very simple way the immense variety of animals and plants surrounding us, as being the result of constant changes in the course of long periods, by the struggle for existence, which causes, that in this struggle that which is imperfect perishes, whilst what is stronger and better survives. Although such an assumption of natural selection is insufficient to explain the gradual progress which natural science must assume in the formation of plants and animals, including man, still it is unquestionably one of the many causes which have effected a gradual development and great variation in all creatures of nature. Life in nature is not so peaceable as the sight of a fine landscape at sunset might lead us to believe. Contest and rivalry prevail universally. Were not the vital force constantly called upon to resist, it would relapse into inactivity. Whatever is to persist must be in motion; the stagnant water becomes a marsh, whilst the violent torrent tolerates no life and carries off rocks.

Not animals only, plants also struggle with each other. Were not the weeds in our gardens being constantly destroyed, the wild growing plants would soon displace our nurselings; thus, the heath and the forest would overspread our acres were they not kept at a proper distance. In primitive forests, creepers surround the mighty trunk, and finally the parasite surrounding it like ivy, embraces only the dead trunk which it has suffocated.

How many plants must perish in order that an animal might live, and how do animals limit their own number! Herbivora become the booty of carnivora, by which the latter become the protectors of the vegetable world; if the carnivora are prevented from increasing, then the number of herbivora multiplies. Every living creature has its enemy. A butterfly causes much destruction in the pine forests, as the caterpillar feeds on the leaves, but upon the birch tree lives its enemy the tailed wasp, which lays its eggs in that caterpillar, in the larvæ of

* Translation of a Lecture, delivered February 1, 1867, at Düsseldorf, by Hermann Schaafhausen.

which the grubs developed from the eggs, after eating away the intestines, become crysalised, in order to reappear as young wasps.

Should man alone stand in creation not exposed to strife and struggle? Who limits him? In most cases he does it himself. Wars and battles are as old as history; man, in fact, rages against his own species as no other animal does. But even the high position man occupies as opposed to nature, and of which he considers himself the chief, is a struggle, a constant labour. In the enjoyment of a high civilisation, in the possession of that mental power, by which he has rendered the mighty forces of nature subservient to his objects—we must not forget the long and laborious path which our species, under obstructions of all kinds, had to pass over until it reached that high stage from which we now look down upon the conquered world. This consideration strengthens the feeling of human power and dignity, that man, although provided by God with the capacity of performing what he has effected, yet that the civilisation which he has reached is his own deed, the work of his own mind.

If any one doubts that human development has progressed in the course of time, the study of any part of human activity, the development of which we can trace, must convince him. The history of language, the progress of natural science, discoveries, and inventions, bear testimony to it. That in countries now inhabited by civilised peoples, savages once housed, whom the ancient historian, as it was thought in exaggeration, described as cannibals, has been recently confirmed by the finds of ancient skulls, rude stone and bone implements, all relics of the past primitive condition of our species. It strikes the student that the picture of the oldest inhabitants of Europe, that we can form from their relics, resembles that given by travellers of still existing savage tribes. We learn that one privileged portion of the human species has advanced in the path of civilisation, whilst others, who are still our brethren, have either, under the pressure of an all-powerful nature, been unable to raise themselves from want and misery; or, living under a luxuriant climate, have given themselves up merely to the gratification of the senses, and lead a life illuminated by only a feeble ray of human reason.

Has Providence indeed distributed her gifts to humanity in so unequal shares? Surely not. But the struggle of man with nature is not attended with equal success. It is as upon the race-course, all strive for the foremost place, which is only afforded to one, and many must lag behind. Many fortunate circumstances must concur before the tender plant of human civilisation can germinate, thrive, and become a stately tree, under the shade of which all people may assemble, even such as have had no share in planting the tree. Justice

is done hereby, so that the civilised man can be, and often has been, the educator and the benefactor of his miserably neglected brother.

In comparing the history of mankind to a mighty stream, political events, which for a long time have alone been considered history, are simply the ripples on the surface, which, when the storm rises, may become towering billows; but that which gives motion to the stream is the never-resting labour of the human mind. What it has effected in liberating man from thousands of chains, which nature has put upon him, will become apparent by the comparison of various degrees of culture, which he has in the course of time successively attained, with those which he still occupies in other parts of the world, and we shall then investigate his life in the different relations in which he stands as opposed to nature.

Man struggles with the elements and with animals; the plant, though it unresistingly affords him nutriment, yet may contain poison which threatens his life; or failure of crops may induce famine. Man further struggles with disease and pestilence, and how much does he labour to escape the inexorable law of nature—death!

Whithersoever we turn our gaze over the great picture of his life, we find man armed against his enemies—here he succumbs, there he is victorious. Nature at first appears like a giant opposed to man. Thunder and lightning, the roar of the tempest, the surf of the sea, will strike the rudest savage with terror: he feels himself to be in the presence of a higher power, which he fears. This fear of God is the first awakening of natural religion; for the knowledge of the goodness of God, the perception of the beneficent effects of nature, is a matured fruit of human thought. All savage peoples believe in evil spirits, who send them diseases and death; and thus the worship of a beneficent God is not found amongst many savages. It does not exist among the Tasmanians, of whom, by the way, one individual only is left;* it is equally wanting among the Mincopies, the savage inhabitants of the Andaman Islands, of whom we only possess information within the last few years. It is said of the lowest tribe of the Bosjesmen in Africa, that they believe thunder to be the voice of an evil demon, on hearing which they creep out of their caves, and reply with curses. Whilst thus the savage curses during a thunderstorm, the agriculturist blesses it, when, after the noisy demonstration of the elements, the floodgates of heaven open, and the fertilising rain pours down after a long drought.

The struggles of man against the gods are subjects of ancient myths, in which natural forces are represented by gods. And the

* "Already, in a few years, we have cleared Van Diemen's Land of every *human* aboriginal."—Knox, p. 230.

belief in a devil sprung up in heathen antiquity, pervading even the Christian period, and which, even amongst civilised nations, has given rise to the burning of witches, is nothing but misconceived nature. When a large block is found upon an extensive plain, none but the devil could have placed it there. But science has taught us that the large stones, the so-called erratic blocks, overlying the whole north-German plain, have been carried away from the glaciers of the Scandinavian mountains by the ice; that they sank to the bottom, which subsequently became dry land. Whenever a sudden pestilence carried off men or cattle, superstition ascribed it to the devil, instead of investigating the causes of the evil and removing them. The savage is still in this condition. The priests of the sun-worshippers of tropical America who, says Scherzer, are at the same time the physicians of the people, press and suck the aching part of the patient for hours; they swear, sigh, and tremble, making all the while the most grotesque gestures, until, at last, they draw from the mouth of the patient a black substance, which they pretend was the devil, who concealed himself in the body and caused the pain.

It must be acknowledged that the growing knowledge of nature is a growing knowledge of God, and that in this sense the kingdom of God is constantly expanding whilst that of the devil is contracting. A man in a higher stage of civilisation recognises a prevailing providence, which in order to preserve the whole destroys a part, so must he admire that divine wisdom, which has so ordained it, that nature should never cease calling forth man's force, which in this struggle and practice acquires new strength. This labour does not merely steel the body, the mind also is developed in this struggle with resisting nature, and the mind is the greatest force of man, it is only to his spirit that nature bends.

The spectacle, how natural forces threaten the life and the possessions of man is as manifold as terrifying. In some cases man is helplessly exposed to destruction; in others he has, with wonderful ingenuity and perseverance, succeeded in protecting himself. The cyclones which devastated India last year have, according to reports from Calcutta, destroyed 60,000 individuals, most of whom were drowned in the rivers. What devastations are caused by inundations and storms! The earth quakes, and in a few moments large cities are in ruins. Lightning may cause a destructive fire, which reduces to ashes huts and palaces; for, as the poet says, "The elements hate man's handiwork."

The savage stands powerless before natural events which the civilised man tries to overcome; but even he, the proud lord of nature, is frequently reminded of his impotence when natural forces

break through appointed boundaries. A few instances may show how man, only by slow degrees, arrives at successfully resisting a mighty natural force, such as that of water.

The North Sea incessantly advances towards the north-western coasts of Europe, threatening to engulph the land. Pliny, the Roman author, speaks of twenty-three islands between Texel and the mouths of the Weser and the Elbe; at present only sixteen of them exist. Already the Cimbri and the Teutons are said to have been driven by inundations from their northern settlements. Migrating to the south, they overran the Roman empire, which finally succumbed to the repeated invasions of the German peoples. The great floods of the thirteenth century are still remembered. Successive inroads of the sea from 1277 to 1287 produced the Dollars Bay in East Friesland, more than fifty villages were thus destroyed. The great Zuyder Zee has a similar origin. Heligoland is diminishing in circumference. At one time it was a large green island, containing seven churches, and had in 1240 three parishes; but whose country is partly below the level of the sea, has learned to construct excellent dykes, for which the Rhenish tarras provides him with good mortar. Well may it be said of him, that he snatches his land from the grasp of the sea; he even recovers what the sea has robbed him of. By means of seventeen steam-engines, the Haarlem lake has been pumped out, and 30,000 acres of land have been recovered, which some years ago already contained one hundred and sixty-four farms, and 5,000 souls. It is also proposed to proceed in the same way in other parts of the country, by which large tracts of land, now submerged, will be laid bare. Venice the magnificent, with its palaces, is built upon piles driven through the mud of the Lagune into the solid clay beneath. A mighty stone dyke, two miles long, 30′ high, 40 to 50′ broad, the Murazzi, the last work of the republic, protects the city from the sea. We know not for certain what may have induced the men of a very remote period to build their habitations on lakes, at the bottom of which we, within the last few years, have found the vestiges of an ancient culture in Switzerland, then in Italy and South Germany. Possibly they did so from fear of wild animals, or not to be surprised by enemies. But, at all events, we must admire the skill with which the pile-works have been constructed, as well as the implements: recollecting that the oldest of the latter belong to a period when the use of metals was unknown. In the Malay Archipelago a similar position has been selected for habitation, as a protection against tropical rain. Thus Venzuela is built on the lagunes of Maracaibo; and the town of Bruni, in Borneo, is also built in that manner. A. v. Humboldt has given a remarkable description of the mode of life

of an Indian tribe on the water. The people of the Gueraunas, on the Orinoko, live during times of inundation, when innumerable animals are destroyed, upon trees, upon which they hang their hammocks, and, covering them with earth, kindle fires in them, to the surprise of the by-passing navigator.

The inundation caused by streams, which the savage tries to escape, has, however, for some civilised peoples become a blessing by fertilising the land. Egypt, formed in part by the alluvium of the Nile, and, as Herodotus said, a present from it, has from the most ancient times ordained its course of life in harmony with this natural event. The whole country is intersected by deep canals, which facilitate the deflux of the waters; but the Nile mud, an excellent manure, according to recent analyses of a French chemist, fertilises to this day the fields, bringing forth plentiful crops. What destruction would not the rapid Po (in its short course from the Alps to the sea, carrying away so much gravel and mud, as annually at its mouth to drive back the sea for 250 feet) have caused, were not its course hemmed in by dykes? The river often flows eight to ten feet above the Lombard plain, which is thus readily watered, and has become the garden of Italy.

We cannot quit these observations without throwing a glance on the development of navigation, a human invention which has recently been greatly improved, and founded man's dominion over the sea.

Even a small rivulet obstructs the path of man; but he contrives to swim over. The animal does the same. Man meditates, and he finds out a better means to cross the water. We see how even the son of the wilderness contrives to make a canoe from a hollow tree; he then adds oar and plaited mat, and by allying himself with one natural force, in order to overcome another force, he sails with the wind against the stream. Still, he does not venture far from the coast into the open sea. At a later period a large ship is constructed, which, with its keel cuts through the water and is moved by the aid of oars, sails, and the helm. But how clumsy are still the ships even of the most civilised peoples of antiquity; of the Egyptians, Greeks, and Romans, the pictures of which we see on the coins, paintings, and sculptures of the ancients. Naval architecture remained for a long time in the same condition. Even among the ships with which Columbus discovered the new world, some had no deck. Navigation, hitherto chiefly confined to the coasts, progressed rapidly in the beginning of the fourteenth century by the introduction of the compass. The magnetic needle, which the Chinese, a thousand years before our era, are said to have used in their transit across the Asiatic steppes, indicates the direction the ship takes even when dark nights hide the light of the

stars. Science has greatly perfected navigation. A seagoing ship is, in fact, an epitome of all our inventions, a practical application of all our knowledge. The observation of the stars shows to navigators the degree of latitude under which he happens to be; the exactly adjusted chronometer gives him the longitude. Upon his chart he finds the direction of the prevalent winds and the gulf-streams indicated. These indications are so important that, profiting by the observations of American and English navigators, the voyage from New York to Europe has latterly been shortened about a fourth, or even a third. And what changes have been produced in navigation by steam! It was in the year 1808 that Fulton built in New York the first steamboat of twenty horse-power, which performed the one hundred and twenty knots from New York to Albany up the river in thirty-two hours. Now we possessed a vessel that, independent of wind and tide, crossed the billows; but this steamer, with its paddle-wheels, was still capable of improvement. The hammering of the paddles upon the water shakes the vessel and impedes the working of the engine; moreover, when the sea is high the paddle-wheels are not equally submerged, one may be high out of, whilst the other is under water. Paddle-wheels are besides exposed to injury, which in a man-of-war is a great drawback. It was then that Smith, an Englishman, proposed the screw for moving the vessel, an idea which had been already mooted by Du Ouet, Bernoulli, Ressel, and Sauvage. In September, 1837, the first screw-steamer made its appearance on a canal. It progressed without noise, no foam of waters on the flanks, nothing but a long circling wave behind the ship betrayed its motion. But the spirit of enterprise in seafaring nations has in other respects improved the art of navigation. England and America rival each other in rapidity of sailing. Stevenson in his yacht made the passage from New York to Liverpool in eight days.

Ships are now built like swimming palaces, with theatres and dancing rooms for five hundred persons, lit up by gas. Such a giant ship loads 18,000 tons, whilst formerly the largest ships were only of 600 tons register. The much admired and now finished *Great Eastern* is 680 feet long, and 87 feet broad. It can, besides her crew, receive three thousand passengers; it has double iron plates, and twenty-four water-tight compartments, so that any injury to the ship can only involve a part. The ship crosses the highest waves without any perceptible rolling. It is moved both by paddles and screws. Four steam-engines, each of 1,000 horse power, revolve the paddles, which have a diameter of 56 feet. A fifth engine of 3,000 horse power moves the screw. The ship is intended for the East India trade, and is able to carry coals sufficient for the whole voyage. Although this gigantic structure,

which at this moment is engaged to pay out the Atlantic cable, has not altogether fulfilled expectations, the attempts will not be abandoned, but will probably be improved. The application of iron instead of wood, has rendered such structures possible; iron has also given existence to iron-clads, which for the future, as it seems, are to decide the supremacy on the sea.

Wealth, which trade brings to a seafaring people, is not the only advantage which man derives from his dominion over the element. The ship of the merchant not merely carries goods, it also carries science and art, and every means of civilisation. It carries the naturalist and the missionary to the remotest peoples of the earth, and makes them participate in the treasures of civilisation which ennobles man. And it is not unimportant to bear in mind what the history of all times has taught us, that life on the sea renders peoples free and great, for upon the high sea man is reduced to his own resources; every moment requires presence of mind. Danger does not paralyse but excites the spirit of enterprise, although many a one finds his grave in the sea. But human ingenuity has not only found means of saving life, but for the recovery of goods swallowed up by the sea. Whole ships with their cargoes have thus been raised from rivers and seas, as at Sebastopol and Cronstadt. The diving apparatus has been latterly so much improved, that man can stay and work for hours under water by the light of the electric lamp; and, by these means, rocks are blown up which render navigation dangerous. The dangers of the sea, especially near the coasts, are lessened by the establishment of light-houses, which are now provided with all the contrivances invented by science. The electric light produced by the galvanic current, has been several times employed when it was found requisite to work at night as well as by daylight, as has been done during the erection of new streets in Paris, and at the erection of the Exhibition building, and also during the construction of the bridge over the Rhine at Kehl. The lime light on the beacons, reflected by parabolic mirrors, exceeds that of the brightest stars; and, although its light does not penetrate distances so great, it still is sufficient to guide the ship through rocks and shallows to the safe port.

It is to the honour of our philanthropic age, that arrangements are in progress at all our European coasts to assist the wrecked. It forms a contrast to the treatment which the shipwrecked have to expect on the inhospitable coasts inhabited by savages. As late as 1858, it happened that some hundreds of shipwrecked Chinese, on one of the South Sea islands, Rossel, were killed and eaten by the natives. The good effected by the establishment of life-boat stations is great. According to a recent Report, published by the Danish government,

1,302 lives have been saved on the Danish coasts since 1851. In 1860 alone, two hundred were thus rescued. From the last Report of the Life-Boat Institution, founded in England in 1824, it appears that, from 1824 to 1863, not less than 13,568 lives have been saved, frequently under the greatest dangers, owing to the high seas and hurricanes. Out of 714, 417 were in 1863 saved by the life-boats of the society, and £1,308 were voted to other boats, by which the remainder were rescued. The arrangements are so admirable, that hitherto none of the crew of a life-boat have perished. Peak's life-boat, being at the same time light, strong, and self-righting, has during the last fifteen years maintained its reputation. Where a boat cannot approach, use is made of the rocket apparatus, by which a rope is thrown to the foundering ship, and the crew rescued by means of a gliding basket. Similar establishments have latterly been founded on the coasts of East Friesland, Hamburg, Bremen, and more are in course of formation.

The destruction of human life caused by the sea may be computed from the reports of a single country. In 1853, there perished on the coasts and rivers of Great Britain and Ireland not less than 989 human beings, by the foundering of 832 vessels. In 1863, the ship-wrecks on the English coast amounted to 1,602, when 568 lives were lost. It must, however, be recollected that 300,000 ships annually enter the ports of Great Britain. Mishaps on the sea also become rarer, as by the aid of the telegraph the occurrence of storms is predicted. Storm-signals are now given on both the English and the North German coasts. Though man cannot secure his life, he has contrived means to secure himself against the loss of his property. This is the fundamental idea of assurance offices, by which we are protected from losses by water, fire, hail, and lightning. Not that any of these natural forces are resisted by the insurance offices, but they simply afford compensation for damage. As our own death may leave others helpless, we have, by insuring our own life, the power of mitigating the lot of those we leave behind.

Perhaps more dreadful and unconquerable than in the element of water, nature appears to us in the element of fire. The highest god of the Greeks, Zeus, sends down lightning and thunder; the eagle hovering in the clouds, holding the lightning in its claw, is still the symbol of royal power. And, nevertheless, man learned to protect his house from the kindling stroke, which, now powerless and obeying man's will, sinks along the conductor into the earth. And yet, although the volcanic eruptions terrify mankind, burying their cities under lava streams, devastating their fields; despite the destructive power of this element, the fire that Prometheus stole from heaven,

the fire guarded by vestals, and which is still worshipped by the Persians, is to man more a beneficent than a destructive force. The fire on the hearth was to the ancients already a picture of domestic felicity; and what would human life be without the manifold uses of fire? The savage may procure it from a tree struck by lightning, or by friction of inflammable materials. In Virgil's *Æneid*, Achates strikes sparks from the flint. The facility with which we obtain this indispensable force, that furnishes us with light, cooks our victuals, melts our metals, by means of an insignificant box of lucifers, is significative of the present state of our civilisation. According to Stuart, the Southern Australians rub dry grass between two wooden sticks to make a fire. Such a proceeding is unknown to the northern tribes; who, therefore, keep the fire up, and should it by some accident be extinguished, they undertake long journeys in order to recover it from some other tribe.

Water and fire are the forces which have produced the greatest effects on nature. They have, either by deposits or by upheavals, given shape to the surface of the earth, and are still constantly at work. Moisture and heat are the most important conditions of organic life. The force which enables man to perform the most stupendous works, namely, steam, is nothing else than water transformed into air by the agency of fire. The neatly constructed locomotive engine running upon our railroads, this snorting fire-horse, does the work of three hundred steeds. What does not steam perform for us? It pumps water, drives ships, draws waggons, paints, spins, weaves, forges, hammers and rolls, presses, ploughs, sows, and reaps. The steam-engines of England and Ireland represent a muscular force of ten millions of men, or two millions of horses. Could as many horses be employed? A horse requires eight times as much land as a man for its nourishment; but, as engines are used instead of horses, it follows that sixteen millions of men more can be fed.

We are in the habit of ascribing certain inventions to certain men; but often it was a mere happy addition, by which they improved what others had long prepared for them. It is in the mental as in the corporeal world, nothing exists all at once; from a small beginning grows a whale. Just as the more perfect plants and animals require a longer time for their development, so the fruits of the human mind require centuries ere they come to maturity. The invention of the steam-engine by James Watt in 1769, was preceded by various attempts to use steam as a motor force, by such men as Blasco de Garay, Salomon de Caux, whom Richelieu sent to Bicêtre as being insane, by Worcester, Papin, Savery. The engine of the latter was improved by Newcomen, and after him by the boy Potter, who turned stop-cocks, who

contrived by attaching cords and catches to admit and cut off the steam. Watt further improved it by adding the condenser and regulator. The first steam-engines were employed to raise water from the mines. In the year 1778, Cugnot constructed the first locomotive, to run on common roads. It was then used on tramways. Blackett and Stephenson then demonstrated that a smooth wheel can run on smooth rails. Seguin diminished the size of the boiler; Pelletar increased the draught by conducting the used-up steam into the chimney. By degrees the consumption of coals was diminished by one-half. It was ascertained that steam produced by higher pressure assumes greater expansive force, and this led to the invention of the high-pressure engine. It was once thought that railroads could only be made on plains, and that they must run straight. At present the locomotive crosses the Alps, and runs in curves. Thus there is a constant progressive improvement in all human doings. Are there limits beyond which we cannot pass? That much yet remains to be done, may be inferred from the fact that even in our best engines coal is still wasted; for, according to W. Armstrong, in these engines one pound of coal produces a force which in a minute raises a million of pounds one foot, whilst from calculation ten millions of pounds ought to be raised. But suppose the supply of coal should fail us, is there another force to supplant that of steam? Perhaps electric force, or we may succeed by a simple process in decomposing water, and use its hydrogen for combustion. Ericsen has employed heated air, and Lenoir gas, as motor forces. In England, parcels and letters are despatched by condensed air.

Let us glance at another spectacle, which presents man's struggle with the animal and vegetable world. In the history of our race, we find first, man in combat with animals—a hunting life is the first stage of man's culture. This is followed by a pastoral life; after which he becomes an agriculturist, and rears plants for his nourishment. He acquires a fixed settlement, trade and industry, art and science, succeed each other; and man finally, by mental labour, reaches the highest step in civilisation, which looks out for higher objects.

The dangerous arts of the beast-tamers, which now surprise us, show the great power possessed by man over the largest and most savage beasts of prey. Even in ancient times, at the beginning of history, man issued victorious from this struggle. We hear of a Nimrod, who was a mighty hunter before the Lord, who cleared the land from wild beasts; of Hercules, who strangled the lion. Of the deeds of the heroes of our own country, whose whole life must have been in remote ages a struggle with the mighty mammals, the bones of

which are found intermingled with human implements, we possess no documents singing their praise; and yet they probably killed the last mammoth, and tamed the wild cattle. They performed the most difficult part of culture, a gigantic work for which our muscular force is scarcely adequate. The Nibelungenlied (speaking of the urus), the wisent, the elk, and the grim "Schelch", speak of a much later period. It has only lately been admitted that the wild beasts have had their share in the education of the human species. The struggle of man with beasts has essentially contributed to the development of man's physical force and beauty; it has called forth his courage and bravery. Asia, the home of lions and tigers, has first given rise to mighty peoples. The African Negroes, among whom the lion is at home, are the most powerful of savages. The Americans, compared with these peoples, seem a much weaker species, as their fights with the puma and the jaguar, the much smaller carnivora of the New World, are less apt to call forth their physical forces. Finally, the Australians, a decaying stock, had in their country no large animals dangerous to them; when Cook found them, they even did not know how to hunt the kangaroo. Man can tame all animals. Hyænas have been described as untameable; but in the oasis of Cordofan they are domesticated like the dog. The old Indians rode on the backs of lions and leopards; they still train small tigers for hunting. Frederic Barbarossa kept some which sat behind the horseman, and leaped down upon an animal on a given sign. Some North American Indian tribes hunt with trained wolves. The taming of some of our domestic animals, which certainly have not been created as such, as has been asserted, seems to have been the labour of thousands of years; for the nature of the wild beast has been almost entirely changed. The wild horse of the South Russian steppes is so savage that it seems almost impossible to tame it. The horse was but very gradually trained for our use. The pictures of Persepolis show no horsemen; even in Rome horses are only used to draw chariots for battle. Cyrus, the Persian king, first introduced horsemanship; but the tradition of Centaurs indicates that there may have been horsemen in ancient Thracia. Although at the time of Moses horses existed in Egypt, yet the Egyptians are not upon the Egyptian monuments represented on horseback, but their enemies, the Arabs and Indians, are so pictured. The finest and noblest race, according to our notions, the Arabian horse, is only the produce of the great and long continued care bestowed upon the breeding of the animal, which is, in fact, his companion in the tent of the Arab. Domestic animals have also their history. Upon an old Egyptian picture the ram is employed in tilling the land, and it is only within a few centuries that the horse has commenced supplanting the ox at the plough.

The large beasts of the forest first disappear before man; either because they are more dangerous, or because, requiring most food, they limit the supply requisite for the support of man. Thus the elephant of Northern Africa, which Hannibal led with his army over the Alps, has entirely disappeared from that part since the end of the fourth century, although lion and tiger hunting was in the Roman period an imperial privilege. Thus the bear has disappeared from Germany, where, for a long time, he was looked upon as the largest hunting animal, and styled in the old songs the king of beasts. The aurochs would long have become extinct in Europe had not the Russian government protected a herd in the Beutowitz forest. The Ibenhorst forest is the only one in Germany where the elk, the last of which was in 1746 shot in Saxony, still exists. The free chase in 1848 has almost exterminated the herd, numbering about four to five hundred. In 1858 the number again amounted to from eighty to one hundred heads. Even the whales, in the capture of which almost all seafaring people are engaged, have diminished in number, and must now be pursued in more distant regions. To the destruction of this largest of all animals the wrongly so-called weaker sex have much contributed. Blubber and whalebone are the most valuable articles of the animal. The price of the latter has greatly risen in consequence of its consumption for making stays; and if it had been used for making crinolines, whales would soon become extinct. The physical force which man wants in this unequal struggle he supplies by craft and skill. To lead large animals into traps in order to kill them is even the work of the weakly savage. Cunning and craft are used both by cultured and uncultured peoples. The Esquimaux, disguised in the skin of a seal, approach the animals lying on the shore, and kill them unaware. Abdel Kader tells us that the Arab approaches the ostrich disguised in the skin of that large bird, and succeeds in killing it. Even the most advanced art still invents new methods to overreach animals. Angle fishing has become more productive and more entertaining since the predilection of the various kinds of fishes for different insects and worms has been ascertained, so that these are artificially produced to serve as baits. In the absence of the requisite physical force to overcome the beast, nature offers another means—poison. The Indians on the Amazon river kill animals by arrows poisoned with curare, a kind of chase, which is also indulged in by Europeans travelling in these parts, and which singularly enough is not unknown among the natives of Borneo, as well as in the Himalaya mountains. This dreadful poison does not render the flesh of these animals unfit for food, and is in these countries as much an article of trade as gunpowder is amongst us. The period of preparing this poison is one of festivity just as the vintage time with us.

This battling against beasts imparts to people a feeling of self-reliance ; the deeds are sung in poems and illustrated by art. Animals from all countries were collected in the Roman arenas, and attended the triumphal processions, by which the Romans acquired the consciousness that they ruled the world. Hundreds of lions, panthers, ostriches, crocodiles, giraffes, bears, and wild boars were destroyed in the circus. Even from England were exported auroxen, elks, and dogs for the use of the Roman circus. The dogs were, on account of their savageness, transported in iron cages. Passionately is the Spaniard still attached to his bull-fights, a remnant of the spectacles of the Roman circus. How soon before the progress of culture wild beasts disappear is shown by England, where, on account of its insular position, access from foreign ports was impossible. In 1680 the last wolf was shot in Scotland, where a century before wolf-hunts took place. The fox, which from its wariness frequently escapes, has, for the amusement of fox-hunters, several times been imported from France. Moreover the fox is merely hunted, not shot. Since the introduction of guns hunting animals are much more liable to destruction. If we did not protect the game in our fields and forests by sparing them during fixed periods, and by game licenses, they would soon become extinct. But some arrangements have only become requisite by the increase of the population and the progress of culture. It was only in the year 1856 that in Russia by an imperial ukase, it was forbidden, in consequence of the great diminution of game, to hunt in the governments of St. Petersburgh, Novogorod, and Pskow, from the 1st of March to June 13th. But that luxuriant and abundant nature, despite the exterminating wars of man, preserves animal life in many instances, is shown by the herring fishing, which is so extensive that the Dutch alone cure above two thousand millions. No diminution of their number has yet been observed, They come in shoals five to six English miles long, and two to three miles broad, often so close that a spear thrown upon the mass remains upright. There seems to be an increase in the number of wild elephants in India ; for only last year the English government was called upon to adopt measures for their destruction in some parts of Ceylon, where they caused great devastations. And yet one hunter alone has killed more than 1,400 elephants, and in England such a quantity of ivory is worked that for its supply 8,333 elephants must be destroyed. One portion of the ivory in trade is derived from the teeth of the antediluvian mammoth found in Siberia.

Unfortunately we see the descendants of civilised peoples, when engaged in the struggle with the vegetable and animal world in regions where they form settlements, relapsing into barbarism. They

not merely exterminate the wild beasts, but also the savages who defend their hunting grounds. The Spaniards in America hunted the native Indians with bloodhounds, just as in our days the runaway slaves are tracked in North America. The natives were shot down like wild beasts in Texas, California, South Africa, and Australia. Collins states that an otherwise respectable man at the Cape assured him that within six years he and his people had captured and partly killed more than 3,200 Bushmen.

It would not be just to speak only of the large animals which attack man, and not of the smaller creatures which are a great plague to him and from which he is less able to protect himself. Man cannot effect much against caterpillars and field-mice, when they appear in large numbers. His only comfort is that these creatures appearing, from as yet recondite causes, periodically in prodigious numbers, they disappear as suddenly. Owls and sparrow-hawks, which we have nearly exterminated, and other smaller birds which we destroy, would have better limited the devastations caused by those small animals than any means devised by man. Southern countries are more exposed to such visitations; Asia Minor, Egypt, and Hungary have suffered much from locust swarms. In 1748 they also devastated several parts of Germany, and of Southern Russia. But their appearance is not everywhere looked upon as a misfortune. In the east, as well as in Chili and in the Philippines, they are eaten, and Livingstone says they are a blessing for some districts of South Africa, where animal food is scarce. One of the most dangerous animals to human culture would be the large white ant if it should spread amongst us, having already once found its way into the magazines of Rochefort. It destroys every vegetable substance, neither papers nor books can be protected from the termites; and it is stated that for this reason no manuscript can be found in India older than three hundred years. All kinds of wooden structures, such as beams, tables, and implements, are within a short time hollowed out by them; but, as they leave the outside uninjured, the internal destruction is not perceived until the whole is accomplished. The minute animal world even pursues us on the sea. There we have the ship-worm destroying the wooden walls, which we try to protect by saturating the wood with creasote or by copper-plating. This species of worm causes so much damage that the Dutch government has lately called upon naturalists to more accurately investigate the mode of life of this animal so as to render it less noxious.

When man goes into battle with animals he frequently makes an ally of such as he has domesticated either for his alimentation or for labour. To some rude peoples certain animals are more indispensable than domestic animals are to us. The Lapp could not exist in the north

without the reindeer; but a man with a small family must, according to C. Brook, possess two hundred reindeer to make the two ends meet. In summer he must leave the interior of Finland with his herds for the coast, because of the gad-fly which torments his herd. The Canadian in a snow-storm is only saved by his little dogs, which rapidly draw his sledge across the icy surface. With the swiftness of an arrow he drives through the frigid solitude, where, as in tropical deserts, thirst torments him, for snow does not quench it. Hence travellers carry kettles with them to melt the snow. If he is obliged to pass the night in the open air, he buries himself deep in the snow, his gun by his side, his dogs above him, they keep him warm, and protect him from wolves. The Tebu-nomad could not cross the Sahara without the camel, the ship of the desert. It can run twenty miles within an hour; neither does the rider on its high back feel the great heat reflected from the soil. The dromedary can live nine days without water, which it smells at a distance of three miles, and of which it can imbibe thirty quarts at once.

On passing from the animal to the vegetable world, we see man, though not exactly battling, yet working hard to derive from plants nutriment, clothing, and fuel. He also prepares from them weapons, implements, habitations, medicines, poison, and intoxicating liquors. Vegetable food and agriculture give rise to milder dispositions than animal food and a hunting life. Cotton is much more extensively used than the wool of animals; and whilst the existing forests provide us with wood, the buried forests of the past furnish the still more valuable coal. Man has as much changed the surface of countries by his influence on the vegetable world as by his dominion over animals. He clears the primitive forests, and sows cereals as he extirpates wild animals in order to graze his flock. He forces the soil to greater productiveness; but he may exhaust it, unless he finds means of compensation. Man may deteriorate the climate, and lessen the fertility of a whole region if he proceeds recklessly and clears the hills of all forests. In Switzerland it was found necessary by laws to protect the forests. They obstruct the lavines from the mountain slopes, they are a protection against the cold winds, so that fruits and cereals can better thrive on the elevated land. Under Frederick William I, the forest which covered the low ground between Pillau and Danzig was cut down for some financial reason. It realised two hundred thousand dollars; but now millions would be given if it were still existing; for the bay is filling up with sand. The destruction of the forest in Moldavia by Russian invasions has exposed that country to north-east winds, and changed many formerly fertile districts into steppes. How frequently have famines shown the dependence of man on the products

of the fields. Although the population of Europe may be double of what it is, we need scarcely much fear a famine on account of the great variety of nutritious plants now cultivated and from the increasing facility of intercourse. Where nature refuses the soil man creates one. The Phœnicians crushed the rocks of Malta, as do the Chinese now in their country to fertilise the ground; where, on account of drought, no grass can grow, man raises water from the depth. The French have in the Eastern Sahara between 1856 and 1860 dug not less than fifty artesian wells, and planted thirty thousand palm trees. When the Arabs saw this, they, who gladly renounce a nomadic life when they can settle near date-palms, fell on their knees and worshipped and called the wells "wells of peace." We also bore for wells to provide large cities. The well of Grenelles yields 5,000 cubic metres in twenty-four hours; that of Passy, 25,000; these 30,000 cubic metres, taking the population of Paris at 1,200,000 souls, furnish 25 litres to each inhabitant.

Whilst the existence of the vegetable world thus forms an indispensable basis for human culture; there are, nevertheless, minute scarcely perceptible plants which can destoy the prospects of whole countries, and even threaten the health and lives of men and animals. They effect this by becoming the causes of disease, such as the potato- and the grape-fungus.

Since 1852 the grape fungus has caused such devastation that Madeira, which formerly exported fifteen millions of bottles, exports scarcely any since 1865, so that the sugar-cane is now being cultivated, although hopes are entertained to import at some future time new vines from Cyprus. Recent researches have shown that microscopic animal life may be the cause of noxious phenomena. Liquids and aliments become corrupt by fermentation and putrefaction. Fungi appear in the former, monads in the latter. Vibriones are found in the blood of scabby sheep. Trichinasis in the swine threaten the life of man. Thus this man, who extirpates the primitive forests and the largest beasts of prey, is nearly helpless in the presence of microscopic creatures, which cause such devastations not by their strength but by their number and their great productiveness.

It is remarkable that also among the larger plants those which oppose us are mostly those of an imperfect species. Thus we try to protect our roofs and walls from mosses and lichens, and the wood from fungi. In hot zones the luxuriant growth of the vegetable world constantly, and with gigantic force, tends to the destruction of man's work. In Central America the ruins of mighty cities have after a few centuries been overwhelmed by vegetation; in fact, buried under it; and they have thus disappeared even more rapidly than the peoples who built them.

We also struggle with numerous diseases and pestilences, formerly looked upon as divine chastisements. No doubt medical science may benefit the individual affected, but taken on the whole medical science, as statistics show, has hitherto had no perceptible influence on mortality. Physicians stand helplessly before wide-spreading pestilences. We see them come, grow, and attain a climax, and then decline, and finally disappear like other natural phenomena. There is one formidable disease which, although the medical art has not been able to destroy, yet has greatly mitigated, namely, the small-pox. Of all the homages done to the noble Jenner, to whom Parliament has awarded £30,000 as a benefactor to mankind, the message from five savage Indian tribes who had suffered from the pestilence may have been most acceptable to him. We also owe to medical science the knowledge that many of these diseases are owing to causes which it is in our power to obviate. A German physician who has travelled over the globe for the purpose of investigating the causes of epidemics, says: Pestilences are not exactly the creations of nature, man himself has contributed to produce them. The large cities, over-populated and in misery and dirt, corrupting the air and the water,—these are the breeding places of contagious and deadly poisons.

We gladly turn from such lamentable pictures, the dark shades of which even the bright light of our civilisation cannot remove.

The strongest limits set by nature to human activity, by which all that we have done always lags far behind what we intended to do, are space and time. The dominion of man over nature has, indeed, not annihilated time and space as we are accustomed to boast, but it has greatly reduced them. Into what immense distances does not man penetrate, and what is time when we send our thought around the globe by the electric wire? The prediction of Fichte is near its fulfilment, who said, "When everything useful that is found in one end of the world is immediately communicated to all men, then will humanity, uninterruptedly without rest or retrogression with united power, rise to a development of which we at present have scarcely any notion." A New York paper lately said: we travel by steam, we paint with light, and write with lightning; how many other wonders does not man work!

Man in his balloon rises 34,000 feet in the air, 5,000 feet higher than the highest mountain on the globe. He casts his plumb-line 50,000 feet into the sea, and brings up the ooze. He weighs the earth, and finds that it weighs fourteen quadrillions of pounds. By the spectroscope he recognises the materials in the photosphere of the sun at a distance of 20,000 geographical miles. He fuses flint, lead, and potash, and produces a lens by which he discovers both the wonders of

the starry world and those of minute microscopic life. With improved instruments he is able to determine $\frac{1}{1000}$ degree of heat, to measure $\frac{1}{2000}$ line, to weigh $\frac{1}{10000}$ gramme. From coal-tar he prepares the most splendid colours; from shavings, brandy. He blasts rocks by means of gun-cotton; he builds machines which work better and more rapidly than human hands. But is not all science a struggle for liberty, a struggle with nature, in order to take from her what she would deny us, and to reveal to us what she has concealed from us. Whatever man knows, whatever he produces, whatever is noble in his breast, all this is merely acquired by labour; for the workings of nature are done in secret. The inert matter resists the formative power of man, and the necessities of the body always draw our senses downwards.

We have seen man in his struggle with the elements of nature, with animals and plants; but that enlightenment of our intellect by science struggling for truth, the representation of the beautiful which glorifies reality by art, and finally the moral force which subdues passion and rude instinct—these constitute the noblest victories of man over nature.

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## ON A HUMAN JAW FROM THE CAVE OF LA NAULETTE, NEAR DINANT, BELGIUM.

By C. CARTER BLAKE, Esq., F.G.S., Hon. Fellow of the Anthropological Society of London; Foreign Associate Anthrop. Socs. of Paris, Spain, and Moscow.

In the autumn of 1866, the Council of the Anthropological Society confided to me a mission to the Wallon district of Belgium, to investigate in co-operation with our energetic Local Secretary at Brussels, Mr. John Jones, F.G.S., the recent excavations made by Dr. Edouard Dupont, of Dinant. My report on this subject, comprising minute details of the geology of prehistoric archæology of the district, was read before the Anthropological Society on Nov. 20th last, and has been passed for insertion in the *Memoirs* of the Society. As in the meanwhile great interest has been excited with reference to the jaw from La Naulette; and, as its more or less simious character has attracted great attention, I have, with the sanction of the Council and Publication Committee, been permitted to publish that portion of the memoir which relates to the Naulette jaw in the present form, without waiting for the publication of the next volume of *Memoirs*.

*Jaw from the Trou de la Naulette.*—The most interesting specimen which has been derived from the Belgian bone caves is the jaw which was found in the Trou de la Naulette, not far from the little village of Chaleux, and also on the south side of the river opposite the Trou de l'Hyène. Dr. Dupont has read before the Belgian Academy a description of this jaw in detail, which contains an account of the particular circumstances under which it was found. In a future memoir, a detailed section will be given of the geological conditions presented in the Trou de la Naulette, and of the strata found therein. It is for this reason that at present I do not offer a section, merely premising the fact that it was found in undisturbed lehm, or limon fluviatile, at a depth of about three metres and a-half from the surface, in a deposit of greyish yellow sandy clay, which also contained remains of *Elephas primigenius* and *Rhinoceros tichorhinus*. This sandy clay is perfectly stratified, and above the spot where the jaw was found are two layers of stalagmite, which alternate with other equally stratified beds of clay. With the jaw was also found a human ulna, and a fragment of reindeer bone, which apparently has been bored by some sharp instrument. Two human teeth were subsequently discovered, one of which fits the alveolus of the canine tooth in the jaw; and another, which was probably an upper incisor. Each of these teeth affords striking and remarkable characters unusual in mankind, and each will be described by M. Dupont at the proper time. I am most anxious not, by any premature publication, to deprive that accomplished observer and generous *savant* from the just honour due to him for his valuable researches.

The first character which strikes the observer is undoubtedly the very slight resemblance which it bears to the jaws found by M. Dupont in the Trou de Frontal; the second is the resemblance which it also bears to the jaw of the Australian. In the words of an anonymous writer (*Reader*, July 28, 1866) :—

"Compared with the extremely 'brachycephalic' jaws which have been discovered in the caves of Arcis-sur-Aube, and from various prehistoric deposits in the south of France, this jaw represents the extreme term of a series, the other end of which is exhibited by the lowest members respectively of the Lapp and Australian races. By the quinqueracinate mode of implantation of its third true molar, by the enormous size of the canines, by the absence of any chin, by the absence of genial tubercles, by the great symphysial beak-shaped degree of prognathism which it exhibits, it affords characters which, though they may be present in different individuals of the lower races of man, have never hitherto been found united in any single specimen."

These, therefore, are the apparent characters; and it behoves us to

inquire how far they are essentially indicative of peculiar racial type, or how far they are characters which naturally come within the limits of individual variation. To do this, the jaws accessible to me in the Museum of Natural History at Paris were carefully examined and measured. The comparison that follows represents the results afforded by the examination of more than three thousand human jaws, in which I was kindly assisted by the illustrious French anthropologist, M. Pruner-Bey. The resemblance which prevails between it and certain typical "brachycephalic" jaws shall be first discussed.

The characters of the "brachycephalic" jaw* have been thoroughly worked out by my friend M. Pruner-Bey. He has placed at my disposal the principal conclusions to which he has arrived, and I am happy to say that in the main they accord very closely with those to which I have myself been led, while preparing materials for a memoir on "the form of the lower jaw in the Races of Men." This memoir I have not yet been able to lay before the Society.

M. Pruner-Bey well pointed out to me the characteristic forms which the jaw so frequently adopts amongst brachycephalic individuals. There are three several forms. One is exemplified in the jaw of a Croat in the collection of the Anthropological Society of London. Here the front of the jaw is produced forward in such a way that the mentum is almost quadrangular. The genial tubercles are large; and deep depressions extend immediately in front of the dentary foramen. I propose to call this the "eurygonic" type, from *ευρυς* and *γωνια*.

The second form is presented in a Wendic skull also in our museum. In this type, which may be called "mesepicentric," from *μεσος*, *επι*, and *κεντρον*, the mental process is much centrally elevated, a gentle ridge or elevation extending downwards from between the two central incisors to the chin; this elevation gradually becoming larger as it descends.

The third form is that which is presented by the jaws from Arcis-sur-Aube, and by that from the Trou de la Naulette. This type, in which the chin is not at all developed, may be called the "agonic" type, from *α*, privative, and *γωνια*. The mesepicentric form is frequently found in dolichocephalic skulls. The eurygonic and agonic, to my knowledge, never.

Amongst the largest series of brachycephalic skulls, we find these types of jaw widely spread over the whole area occupied by the nations who have been called *brachycephali prognathic*, by Retzius. M. Dupont has figured the most striking examples of the agonic type in his memoir, where it will be observed that the jaw from Arcis presents the essential characters afforded by the jaw from the Trou de la Naulette, although to a far less extent.

* This "Hibernism" must be permitted.

In a comparison of the jaw from the Naulette with typical human jaws, I propose to divide my remarks as follows:—1. Measurement; 2. Alveolar curve; 3. Dentition; 4. Symphysis; 5. Chin; 6. Conclusions.

In instituting a series of measurements of the Naulette jaw, I have thought it only necessary in the present case to give comparisons with a jaw from the Trou de Frontal (reindeer period) with a brachycephalic jaw from Hyères (closely resembling the celebrated Moulin-Quignon jaw), with three brachycephali of existing Eastern European races—a Croat, a Wend, and a (female) Masure, with an Australian jaw belonging to a debased individual of the tectocephalic type, with the jaw of a male English Northumbrian brachycephale from Alnmouth, and with the jaw of a recently living Englishman ("Celtic" type of M. Pruner-Bey), from Milcote, near Stratford-on-Avon. The following are the results.

*Table of Measurements (Mandibular) in Millimètres*

| | Height of chin outside. | Ht. of jaw under first premolar. | Ht. of jaw under third molar. | Dist. of dental foramen from lower border. | Dist. of dental foramen from alveolar line. | Dist. of dental foramen from centre of chin. | Thickness of jaw at chin. |
|---|---|---|---|---|---|---|---|
| Trou de la Naulette | 33 | 26 | 23 | 13 | 13 | 31 | 15* |
| —— du frontal | 28 | 25 | 23 | 13 | 12 | 37 | 12 |
| From Hyères | 29 | 30 | 25 | 15 | 18 | 30 | 11 |
| Croat | 27 | 26 | 23 | 13 | 14 | 28 | 14 |
| Wend | 28 | 27 | 22 | 11 | 14 | 27 | 15 |
| Masure | 28 | 21 | 22 | 12 | 13 | 23 | 13 |
| Australian | 30 | 29 | 27 | 15 | 17 | 34 | 14 |
| Alnmouth | 27 | 25 | 25 | 14 | 13 | 27 | 16 |
| Stratford | 36 | 34 | 28 | 15 | 19 | 31 | 14 |

* It must not be forgotten that there are no genial tubercles.

*Table of Measurements (Dental) in Millimètres.*

| | Total length of incisors outside. | Total length of incisors inside. | Length of premolar outside. | Length of premolars inside. | Length of molars outside. | Length of molars inside. | Length of premolar 1. | Length of premolar 2. | Length of molar 1. | Length of molar 2. | Length of molar 3. | Breadth of molar 3. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Trou de la Naulette | 22 | 17 | 18 | 14 | 34 | 30 | 7 | 9 | 10 | 12 | 14 | 7 |
| —— du frontal | 19 | 17 | 14 | 12 | — | — | 8 | 6 | 11 | 11 | — | — |
| From Hyères | 18 | 16 | 12 | 12 | — | — | 8 | 6 | 11 | 10 | — | — |
| Croat | 18 | 17 | 13 | 13 | 27 | 27 | 7 | 7 | — | 9 | 10 | — |
| Wend | 19 | 17 | 13 | 12 | 31 | 29 | 7 | 6 | 12 | 10 | 9 | 8 |
| Masure | 21 | 17 | 13 | 12 | — | — | 6 | — | 9 | 10 | — | — |
| Australian | 20 | 17 | 14 | 13 | 36 | 33 | 7 | 7 | 12 | 11 | 11 | 9 |
| Alnmouth | 10 | 16 | 12 | 11 | 29 | 28 | 5 | 6 | 10 | 9 | 9 | 8 |
| Stratford | 17 | 16 | 11 | 10 | 30 | 29 | 5 | 5 | 10 | 9 | 8 | 8 |

The first character which strikes the observer is the perfect accord-

ance of the curve which the lower border of the jaw makes with the same curve in the jaw from the Trou de Frontal and the great dissimilarity which it presents with the curve of the Celtic jaw and of the Australian. This character alone, when distinctly conceived, would be entirely decisive against the hypothesis of the "pithecoid" nature of the jaw; inasmuch as not even in the young anthropoid ape, wherein the jaw presents a more equable curve than in the adult, does the curve of the lower border in the slightest way resemble that of the homologous structure in man.

*Dentition.* It is a source of great regret that when the jaw was discovered no teeth were in place. Since the discovery, however, an incisor and a canine tooth have been found, which present peculiar characters. As, however, M. Dupont has not yet described these, I forbear to publish any account thereof.

The characters of the dentition in the existing races of men have been well and thoroughly described, both in the "Odontography" of Professor Owen and in Dr. Webb's "Teeth in Man and the Anthropoid Apes." I shall cite from the latter work, which unfortunately is not in general circulation, a few passages, before proceeding to point out the characters afforded by the dentition, as evinced by the alveolar condition in the jaw from the Trou de la Naulette.

I first give the characters of the jaw in the leading types of anthropoid apes: "In the lower jaw, the three molar teeth of the gorilla are equal in size; in the chimpanzee they are nearly equal, the first being only slightly larger than the last. The implantation of these teeth resembles that in the human subject, except in the fact that the two roots of the second and third are never found connate in the gorilla and chimpanzee."—(*Loc. cit.*, p. 34.)

"In man, on the contrary, this bifurcation is most apparent in the third molar. As in the upper jaw the last-named tooth (the third molar) is the smallest of the true grinders, each molar is implanted by an anterior and a posterior sub-compressed fang, which are grooved along their opposed sides. It is not uncommon to find these fangs more or less connate in the second and third teeth of the series."—(*Loc. cit.*, page 33.)

"It is usual in melanous races to find the third molar in both jaws relatively larger than in Europeans, and, as we have already noticed, the fangs are most commonly distinct."—(*Loc. cit.*, page 40.)

"Professor Owen has observed, that in the melanous varieties generally the true molars are of large size, and that the fangs of the wisdom and penultimate molars are not as a rule connate or conjoined. This he finds generally to obtain, although it is most remarkable and constant in the Australian variety. The truth of this observation is not for a moment to be disputed, albeit we meet with exceptions which prove it not to be a ground of specific distinction, and as such it is not advanced by Professor Owen himself. But in

these, the lowest races of Africa, we do not find the molar series attaining a remarkable size. In the skull of our female Bosjesman we have examined, the three molars present (the dentes sapientiæ, upper jaw, were not in place) were of moderate size; neither they nor the pre-molars differed from the usual standard."—(*Loc. cit.*, page 39.)

"In the negro, the true molars are usually of large size, generally larger than in the European; the dentes sapientiæ, although smaller than the other molars, are, in the majority of instances, of greater relative and actual dimensions, and the fangs of the last-named teeth are usually distinct in both jaws."—(*Loc. cit.*, page 41.)

"We have ascertained by measurement that the antero-posterior dimensions of the true molar series in the upper jaw in eighteen negro skulls, varied one inch one-and-a-half lines to one inch four lines, the former measurement being less than is frequently attained by the same series in the civilised races. A similar result has been elicited by the admeasurement of the true molar series in the lower jaw. To show how the dimensions of the grinding teeth vary even in individuals of the same stock, we may state that we have before us, at the time of writing, three lower jaws of Anglo-Saxons, for the possession of which we are indebted to an eminent archæologist, the late Secretary to the Society of Antiquaries. In one of these the fore and aft measurement of the true molar series is one inch one-and-a-half lines, in another one inch three-and-a-half lines, in the third one inch four lines. We have seen the last-named measurement exceeded in only one African jaw; in it the lower true molar teeth measured from before backwards one inch five lines."—(*Loc cit.*, page 42.)

Dr. Webb goes on to observe: "Dr. Lund, a Danish geologist, who professes to have discovered fossil human skeletons in the Brazilian bone caves, characterises the incisor teeth of the fossils as having the upper surface oval, and of longer antero-posterior than transverse diameter. On the supposition that he has not been mistaken as to the human character of the remains in question, it is most probable that he has fallen into a similar error with Blumenbach, in confounding the worn with the natural condition. Such a configuration of the unworn incisor teeth is not to be found in any known tribe of Indians: neither, as far as our information reaches, has it been discovered in any accredited skulls of extinct races."—(Page 54.)

"The dentes sapientiæ, which of all human teeth are subject to the greatest variety, are usually in the Malayo-Polynesian of typical proportions; that is to say, they are considerably smaller than the penultimates. Differences in the complexity of their implantation are of constant occurrence. In many instances they are inserted by distinct fangs, whilst occasionally the fangs of the third molars may be found as connate as is most usual in the Celt and Saxon."—(*Loc. cit.*, page 46.)

"In the skull of a native of Erromanga, an island of the western division of the New Hebrides, preserved in the Osteological Department of the British Museum, we observed that the fore and aft measurement of the lower molar series was only one inch one-and-a-

half lines, whilst in the upper jaw the same measurement was one inch one line."—(*Loc. cit.*, page 52.)

"The dimensions of the true molar series vary in Australian crania, not only in the length of the entire series, but in the breadth of the individual teeth. In twelve Australian skulls we found the antero-posterior measurement of the true molar series in the upper jaw to range from one inch two lines to one inch four lines; in five lower jaws we found the same series measuring from one inch two-and-a-half lines to one inch five lines in length."—(*Loc. cit.*, page 49.)

"Now in the West Coast African negro, the true molar series of the upper jaw occasionally attains the length of one inch four lines, that of the lower jaw one inch five lines, in both cases equalling the extreme longitudinal measurement in the Australian. In the skulls of an Affghan, a Hindoo, a New Zealander, an American Indian of the Chinook tribe, a Patagonian, an Indian of Tierra del Fuego, and in an early English skull, the fore and aft measurement of the same series in the upper jaw was one inch three lines respectively: in the lower jaw of the Affghan it was one inch four lines; and in the Chinook Indian mandible one inch four-and-a-half lines. It will be observed, that these measurements are all greater than the minimum noticed in the Australian. The greatest antero-posterior measurement of the true grinders we have noted, is in the lower jaw of an Englishman, of abnormal stature, in the Museum of the Royal College of Surgeons: it is one inch six lines."—(*Loc. cit.*, page 50.)

"The fore and aft measurement of the upper true molar series in the white races we have found to vary from one inch half line to one inch three lines; the lower, from one inch one-and-a-half lines to one inch four lines. The maximum in both cases has been obtained from crania of early inhabitants of this island. The greatest diminution of the third molars that has occurred to us has existed in modern English skulls. A complex implantation of the wisdom tooth is the exception; but as an exception it is not very rare."—(*Loc. cit.*, p. 56.)

Such being the characters presented in the principal races of men, I shall now proceed to describe the condition of the alveoli of the present jaw. The incisor teeth form an equable curve, which differentiate them strongly from the deep conically fanged canine. The socket of the first premolar, rounded and compressed from side to side, is nearly parallel to that of the canine; the socket of the second premolar is turned slightly outwards, especially in its posterior position. The first and second premolars both exhibit the normal European implantation by one fang; and the canine, so far as can be judged from the alveolar, exhibits the prevalence of the same law.

The first true molar has a squared socket, prominently and distinctly divided into two well marked fangs; the interval between which has been greater than customary in normal European lower jaws.

The second molar has also been implanted by two fangs, the an-

terior of which has perhaps shown a slight tendency to bifurcation. Its level in the alveoli is a little below that of the first molar, but there is every reason to believe that it was fully developed during life.

The third molar, the most remarkable of all, is much rounded in its posterior, and slightly angular at its anterior corners, forming outwardly, inwardly, and backwardly a quasi-circular arc. Traces are distinctly visible on the original specimen, as well as (though to a less extent) on the cast of the implantation of the tooth by three fangs into this alveolus. The internal side of the alveolus, on its anterior corner, exhibits a smoother surface, terrace-like in form, which extends around a part of its periphery. A similar condition has been noticed in several Australian jaws.

In a typical Australian jaw in the collection of the Anthropological Society, the implantation is functionally and definitely by two fangs, the anterior one having a tendency itself to bifurcate. In the other Australian skulls which I have seen, I have never yet seen any tendency to bifurcation.

The socket of the third molar, unlike its homologue in most Australian skulls, is much larger than that which contained the second molar; a similar condition is, however, presented in an Australian jaw in the British Museum. This character, however, is extremely unusual; and in this respect, as well as in the complex implantation of the third molar tooth, the jaw before us presents an exaggeration of the Australian type.

Turning to the symphysis, the first character which strikes the observer is the enormous deposit of bone, which, filling up the symphysical cavity immediately above the fossa which contains the sublingual gland, has left a bony terrace, traces of which are to be observed on the internal face of the jaw, so far back as the first premolar tooth. In the young orang (*Simia Morio*) this shelf-like structure occupies the same space, and is bounded by the same limits. This, at first sight the most strikingly simious character in the jaw, has struck all the observers who have previously seen it. Careful and diligent comparisons with the jaws of Europeans, Australians, and Esquimaux, have failed to afford me examples of a similar case. Its great and apparent resemblance with the homologous structure in the jaw of orang may lead to conclusions which bear out the "pithecoid" theory; but when we reflect that the character is purely adaptive, and that the relative and absolute great thickness of the jaw at its symphysis originates this shelf-like structure, which is solely caused by the great deposit of osseous matter around the site of the genial tubercles, a lesson of caution is impressed on us.

The mental prominence is not developed; in this respect according

with, though exaggerating the peculiarities of the jaw from Arcis sur Aube (also coeval with rhinoceros and hyæna). It will be exceedingly difficult to match this amongst any jaws either of the white or black races of man; at least, I have not yet been able to find a similar specimen. When the jaw rests upon its lower border, a vertical line let fall from the point between the two middle incisors touches the ground 4 *mm.* in front of the chin; in a well-formed European jaw, it is 12 *mm.* behind the chin; in an Australian jaw, it is 2 *mm.* behind it.

I now have to consider the variations, if any, afforded by the points for insertion of muscles on this jaw. It must always prove a source of extreme regret that the ascending ramus was broken away by some abrupt force, which has also shattered the dextral half of the jaw immediately behind the first premolar. On the left side the ascending ramus has been also broken away, but sufficient portion of it remains for us to say with certainty that the masseter muscle was not excessively marked on it. None of the muscles, in fact, have excessively pronounced points of insertion, a character which may lead to the inference that the individual was a female. This attributed character is further corroborated when we examine the close general resemblances which it presents to the jaw of the female Masure above measured. The external oblique line is not strongly marked. The mental foramen is situated in the centre of the point of attachment of the *depressor anguli oris*, instead of, as is most usual, being slightly above. In this character, as well as in the general obscuration of the external oblique line, the specimen accords more nearly with the Australian than with the European type. The insertions of the *levator menti* and *platysma myoides* do not exhibit any special characters. Turning to the internal surface of the jaw, the digastric muscle has left remarkably deep insertions, exceeding in character and depth those presented in any jaws I have yet examined. The tubercles for the attachment of the *genio-hyoideus* and *genio-hyo-glossus* muscles are absent. Their place is filled by an irregular elevation. Gray observes, "Sometimes the tubercles on each side are blended into one, or they all unite into an irregular eminence of bone, or nothing but an irregularity may be seen on the surface of the bone of this part" (page 62). The mylohyoid ridge is strongly marked; it is largest and thickest immediately above the digastric fossa. The mylohyoid groove has been normal; the mylohyoid ridge shelving strongly above it near the attachment of the *superior constrictor* muscle. The fossa for the submaxillary gland has not been deep.

Such, therefore, are the chief characters afforded by the above jaw. Many diverse opinions will probably be expressed respecting its affinity. Its undoubted resemblance to the jaw of a young ape I shall not ven-

ture to deny; nevertheless, I shall not attempt to offer any theory respecting the mental or social status of the individual, or of his or her complexion, stature, or probable appearance. In the present state of the case, we have not all the materials before us. I have intentionally refrained from stating all the characters which some of the other remains present, as M. Dupont will adequately describe them elsewhere. At present I shall merely propound the following conclusions, based solely upon the evidence I have laid before you.

1. That the deposit of stratified *limon fluviatile* under stalagmite, in the Trou de la Naulette, was due to the action of slowly operating causes.

2. That the individual whose jaw was found therein was contemporary with the elephant and rhinoceros, whose remains are embedded under like conditions.

3. That some of the characters afforded by the jaw indicate a resemblance to jaws of the Slavonic peoples of Eastern Europe, as especially exemplified by the Masures and Wends.

4. That the above character affords a distinction between the remains found in the Trou de la Naulette and those found in the Trou de Frontal, which contained during the reindeer period individuals strongly resembling the Calmucks of the present day.

5. That some of the characters indicate a strong resemblance to, and exaggeration of, the characters afforded by the melanian races of men, and especially the Australian.

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## PHENOMENA OF THE HIGHER CIVILISATION

### TRACEABLE TO A RUDIMENTAL ORIGIN AMONG SAVAGE TRIBES.

By EDWARD B. TYLOR, Esq., F.A.S.L., F.R.G.S.

MEN have so long felt an interest in the character and habits of their own kind, they have so long practically acknowledged that nothing human is alien to themselves, that we are rich in information as to savages and peoples whose condition lies between that of savages and our own. But the positive value of this information is only now of late years beginning to be apprehended. It is only of late that we have begun to see how much a knowledge of the lower races is capable of giving us besides a mass of entertaining details and quaint stories for our amusement, and beside the means of completing the picture of mankind by taking in both its higher and lower developments. We are beginning to see that over and above all this, the study of the lower races is capable of furnishing most important knowledge about

ourselves, about our own habits, customs, laws, principles, prejudices, —and that this knowledge is, to a great extent, of a kind that we should have found it much more difficult to obtain had there not happened to exist a mass of tribes on the earth at a lower condition of life than ourselves, and records collected in past times of many more such peoples who no longer exist to be studied, for they have been swept off the earth as an incumbrance by other occupiers of the land, or enslaved, or mixed, or civilised out of their earlier and ruder state.

There are few audiences before whom such a subject as this, of the study of the lower races to explain the condition of the higher, can be brought forward with more chance of enticing new workers in this field than a section of the British Association. It is not my purpose to go at length into the details of this study, which would be far too wide a task, nor even to sketch it in outline; but to take a few examples from different departments of the subject, with the view of showing how in one branch of knowledge after another the lower races are capable of showing us in actual existence the state of culture out of which much of our own civilisation has developed itself so far that we live in the midst of it with ideas of its nature widely changed from those of the early time from which we inherited it, or simply with no ideas at all of what it means.

To begin with a branch, which is, perhaps, longest and best known, the stories of uncivilised races about their gods and heroes, cosmogonies, transformations, and origins, show us the mythologic stage which underlies the poetry and religion of the Greeks and other nations, from among whom the highest modern civilisation has grown. This stage is not only represented by its effects as inherited from past times, as it is in Homer. The very savages who live at our own day show us living and walking men whose mythologic thought and life corresponds in a great measure with that of the early myth-makers of our own Aryan race. Sir George Grey's *Polynesian Mythology*, for instance, will set before us the description of the great events of nature with only the thinnest veil of personification, just enough to show how such stories pass more and more into tales of gods and heroes, whose origin and attributes grow more and more indistinct, as one story-teller after another works up with new flourishes and graces the old familiar tales.

We have two primeval ancestors, a father and a mother, says the New Zealand myth. They are rangi and papa, heaven and earth. The earth, out of which all things are produced, is our mother; the protecting and overruling heaven is our father. Once upon a time the heaven was much closer to the earth, and their children took counsel

how to thrust it up. The god and father of cultivated food, Rongo-na-tane, tried to force up the heaven, but he was not strong enough. Then the god and father of uncultivated food, of fish, and of men, tried; but again in vain, till at last there arose Tane-Mahuta, the father of the forest trees. He set his head against his mother, the earth, he raised his feet and pushed against his father, the sky, and strained his back and limbs with mighty effort; and so he rent apart rangi and papa, forcing the earth down from beneath him, while he pushed up the sky above. What can be more transparent than this story, which embodies the insignificance of the little food-plants and the wild vegetables and men; while the forest tree thrusts its head, which is its root, against its mother earth, and pushing with its high trunk, rests its feet, which are its branches, against the clouds, and holds them apart from the earth below. Like so many imagined histories of times long past, the New Zealand mythology is, in great part, really the record of the very events which happen day after day before our eyes in the growing of the forests, the rising and setting of the sun, the battles of the winds and clouds. It goes on through one department of nature after another, telling us, under the same transparent veil of personification, how the god of winds sent his four sons to the four quarters of the world; they are the north, south, east and west winds—how the children of the fish god separated, and some went inland to be the fish of rivers and lakes, and some took up their abode in the ocean, and so forth.

It has been well said, I think, by Grote, that the mythologic history of the Greeks is the history of a past which was never present. But in another sense, much of it, much of the tales of gods and heroes is the history of a past which is ever present, the history of the daily life of nature before our eyes, only put into dim personification and assuming a claim to a historical significance which has only arisen from a profound misunderstanding of its real nature. Now it is a great thing to find the spirit of the mythology to which the world owes so much of its poetry, its philosophy, even of its religion, alive in actual being among us, and ready to be studied. But we shall find that not only the spirit, but the very details of mythology, such as in a different stage have been taken up into the classical stories of Greece, are often to be found among the lower races now, scarcely removed from the original state in which they were first engendered in the mind. The great sun myth, for instance, which recent researches have shown to have had so great an influence in shaping the higher mythologies of India, Greece, and Scandinavia is admirably represented from the contemplation of nature in an early stage of its growth among the Polynesians, and the Indians of North and South America. I will bring for-

ward one case, partly because I believe it to be new, partly because it shows in what minute details modern savage life may illustrate the later grown mythology of ancient Europe.

One of the great events of the voyage of the ship *Argo* was the passage of the Symplegades. There were two rocks which alternately opened and shut with a swift and violent collision, and between them, by the assistance of Athene, who held the rocks asunder for a moment as they shot through, the good ship passed. Now what can have put into the mind of the story-teller this strange idea? That it is not a record of real fact, that it is of no use to look through the maps for the two rocks, which, as the story relates, ceased to open and shut when the *Argo* had passed through, any modern mythologist would acknowledge. But how did the idea of such a thing enter the mind of the myth maker? To call it a quaint poet's fancy is easy but not satisfactory. The more ancient thought and savage thought are studied, the less will students be disposed to take as an explanation of the story the reply that it is a quaint fancy, for the more these things are looked into the more it appears that even the quaintest stories have an origin in something intelligible and definite; that they grew up by processes which are quite intelligible even now. The story of the Symplegades, as it is told in the *Voyage of the Argo*, is a fragment of a myth transplanted with many other wonders into the great Argonautic fable; and if we knew nothing more about it than we learn from its existence there, its meaning and origin would probably have ever remained dark to us. But if we turn to Eastern Asia we shall find the Symplegades no longer an isolated and unintelligible fragment, but a part and feature of the great sun myth. We know, in the first place, that the conception of the night as a huge monster which swallows up the evening sun, is a wide-spread and familiar one. *Evening* in Sanskrit is rajanîmukha, the "mouth of night". What this "mouth of night" which swallows up the sun may be like, with what jaws it is furnished, two Eastern peoples will tell us. Mani is the sun-god of Polynesia—he is among the fullest and most consistent bearers of the sun-myth to be found in the world. Mani is the sun, and the night is his great ancestress, Hine-nui-te, "goddess of the night." Of course she is his ancestress, for the night is the mother or producer of the sun, as well as his destroyer. Mani was told, as he approached the end of his brilliant career, that he would be conquered by his great ancestress Hine-nui-ti-po, whom you may see flashing, and as it were opening and shutting there where the horizon meets the sky. Her teeth are hard and sharp like pieces of obsidian, and her hair like the tangles of long sea-weed, and her mouth is like that of a barracuda. Mani undertook the venture, and, had he succeeded in getting into her

mouth and coming out again, she would have died and he would have lived. But as he went in she awoke and killed him, and then death came into the world, for she is the goddess of death; and had Mani passed safely through her no man would have died.

For a further description of the jaws of night we may go to the Karians of Burmah, who tell us that at the west are two massive strata of rocks continually opening and shutting, and there the sun goes in at sunset. "At the opening and shutting of the western gates of rocks thou goest in between; thou goest below the earth when the sun travels." Perhaps the most striking coincidence between these stories and the Argonautic tale is that in both, the first event is to determine the future course; yet this feature is not servilely copied, but the same idea is worked out in two converse ways. If Mani got through he would come out again at the other side and live, and the jaws of death would no more close on mankind;—if the *Argo* got through the Symplegades, they would remain for ever open for others. The *Argo* passed through, and the rocks stayed fixed open for ever; but Mani was caught, and the reign of the goddess of night and death began.

That fragments of what was once a consistent conception of mythology often survive to be taken up into future stories as mere isolated wonder-tales, is well-known. This history of the Symplegades seems to be such an incident, only explicable when we can find it in its place as a feature of a large and consistent mythological system. Such another case is the story of the great floating tortoise which the sailors mistake for an island, and land upon, and which, irritated by their digging into its back or making fires on it, plunges down into the sea. When we meet with this story isolated as in the Arabian nights, we can only treat it as another quaint fancy of the myth-maker, but an acquaintance with the cosmogony of the lower races explains it and throws it into its place at once. To a modern Polynesian, as to so many ancient races, the world he lives in is a flat plain surmounted by a vaulted roof or heaven. The idea is precisely expressed by comparing it to a dish with a dish-cover placed upon it, and equally well by calling it a tortoise, the flat under shell of which is explained in the Indian books to be the earth, while the arched upper shell is the heaven. And thus we have the wide-spread and ancient myth of the world tortoise which lies floating on the ocean; and thus when we find the idea on a smaller scale reduced to the dimensions of a mere floating tortoise-island, we recognise what was once and is now in other regions a thorough characteristic piece of the cosmogony of the lower races, reduced to a mere tale by story-tellers, whose fancy was taken by an idea the real origin and meaning of which was lost to them.

In using our records of the lower civilisation to explain the pheno-

mena of the higher, there is one plain rule above all things to be observed. When we find an opinion or a practice among the higher races which they can only explain by saying that it is a tradition, a ceremony, or an instinct, but which is not clearly explicable by the circumstances among which it is found; and then, when among a lower race we find the same opinion or practice having an intelligible meaning or a practical purpose belonging to their state of mind, we are justified in thinking that we have traced these things to near their origin. To do this is to look through seeming nonsense till we find a solid basis of sense, and past investigation proves that we may continually succeed in such search.

If we make ourselves familiar with the state of thought among lower races, if we can see with their eyes, and judge by their canons of reasoning, we shall find many things full of sense and purpose to them which it would be far more difficult to explain from the point of view of higher races, among whom similar phenomena are to be found. I will take as instances two of the great religious practices of the world, found in most known times and places—the rites of sacrifice and fasting.

What meaning and intention is applied to these rites in periods of high culture we know perfectly well. They are partly held as ceremonies or ordinances to be practised because enjoined upon men, and partly as producing an effect on the mind of the worshipper who places himself under a discipline of privation or suffering. But if we turn to study the same rites among the lower races, we shall see them in a new light—we shall find them done for what, to the mind of these people, are perfectly direct and matter-of-fact purposes. We shall find a state of thought under which it is as practical and straightforward a thing to burn or bury a sacrificial offering for a spirit, as it is to pay a debt or give a present to a living man, and as practical and significant a proceeding to fast as to eat. A modern European, who holds that he has a soul, but that even his horse or dog has not, must transport himself into an entirely different philosophical atmosphere when he begins to study savages. He will find then that not only men and dogs, and horses and birds, but even trees and corn, fruit, hatchets, and spears and boats have souls. When a man dies, his soul, which is an impalpable, usually invisible something, goes away like his body, somewhere into a future life. Therefore the slaves or wives who have attended him when he was alive, must go and attend him still, and they are, therefore, killed that their souls may follow his soul. And in precisely the same way, and for precisely the same reason, the horse and the dog are killed that their souls may go to serve their master; the corpse, the clothes, the bow and arrow, the pipe and pouch are burnt, buried, or abandoned, with the distinct understanding that

their souls or spirits are to go for the use of the spirits of the deceased. Thus, among the Indians of North America, fishing and boating tribes bury their dead with canoe and paddles ready to launch in the next world; the dead man's soul accompanies the soul of his canoe, with the souls of the paddle and the fishing spear within his grasp. Or if he belongs to a hunting tribe he will have his bow and arrow, his gun, or his horse, ready for his soul to mount in the happy hunting-grounds of the next world. It would be quite tedious to give a detailed account of these funereal rites—the lower races who do not practise them are the exception, not the rule. We find sacrificed for the use of the deceased every part of his possessions, wives, slaves, relatives, horses, house, food, weapons, boats, clothes, ornaments, provisions for the journey, the dog to guide the dead along the difficult road to the other world, the coin to pay the ferry over the gulf which separates this life from the next, or for the toll to pass the heaven-bridge. And there is not the least break in the purpose for which these things are sacrificed—it is not that the wives or slaves are sent to accompany the dead, and the horses, canoes, or weapons destroyed for some other purpose. The philosophy of the lower races is distinct and unbroken throughout; when the slave or the horse, or the bow and arrow are burnt to ascend in smoke to the sky, or buried to rot in the ground, the souls of these things are sent to follow the soul of their possessor. The wife of Eukrates comes back for her slipper. It had been left behind a wardrobe, and thus not burnt with her other things, and so she was in the other world without it. So the ghost of Melissa appeared shivering to her husband, for her clothes had not been burnt for her to wear in the other life. So in the East of our own times the native of the Sulu Archipelago buys for a great price the criminal condemned to death, that he may kill him himself and so secure the service of his soul as a slave to his own in the next existence; and so the soul of the Emperor of Cochin-China is provided with every article of furniture and luxury which belonged to him when alive, and is sent to him by burning it after his death, while supplies of food go on being prepared for him as usual for his spiritual sustenance.

When we find that in parts of South America these practices actually stop the rise of civilisation, because when a man dies everything he has, house, trees, weapons, all must be sent after him, and so accumulation of property is impossible—or when we find it specified among the customs of some North American tribes that the polished stones or bowls used in the national game are the property of the community, and so are exempted from being buried with the dead like other things; we may gain some idea of the strength of this opinion as exemplified in thousands of recorded accounts from early

and late times in most distant portions of the world. The sacrifice to the dead is, indeed, the leading branch of sacrifice among the lower races.

We follow it up into symbolism and ceremony at last, after the manner of rites in general, when they are taken up into the religion of the more advanced races.

We are all familiar with the silvered paper dollars, the paper clothes and presents which the Chinese burn with their dead; and the like transition from practical purpose to fading symbolism is well marked in the offerings to the dead kept up as a mere ceremony at Rome, in the models of toys and ornaments in early Christian graves, and the flowers thrown into graves or hung in garlands above them in our own times.

But sacrifice to other spiritual beings, to elves, wood-spirits, gods inferior or superior, is conducted in the same way and on the same principle as that to the spirits of the dead; though it is, perhaps, oftener found passed into a ceremonial ordinance among the higher races than as a matter of practical purpose among the lower. Yet we shall find no distinct demarcation between the souls of the dead, who are held to become spirits, demons, or gods, and spiritual beings in general; and we may find just the same explanation of the intention of sacrifice laid down with reference to them as to the ghosts. The Chinaman sets out his feast of the dead, waits awhile till the ghosts have eaten their fill of the soul food, and then falls to himself on the corpse. Exactly so the Fijian sets out feasts to satisfy the enormous hunger of his gods; but they are spiritual beings, and what they eat is not the visible substance of the food, but its soul which is capable of separating from it. So a sacrifice of meat and rice is set out by the Rajmahal tribes under a tent, and when the god has had time to eat his fill the worshippers uncover the tent and eat the rest themselves. This is, indeed, a most common practice throughout the world, that when an offering has been made to a god the worshippers themselves may feast on it; and this idea is perfectly reasonable when we understand the theory of souls to which it belongs.

Thus we may see among the lower races that the rite of sacrifice is not the ceremonial observance, or even the act of abnegation, that it is among the higher races who have carried it on into their religious system; but a plain and practical action done to produce what is, to their state of opinion, a plain and practical result—that of giving to the ghosts of the dead, or other spiritual beings the spirits of men animals and things acceptable to them, just as they would give a gift to a living man, or pay tribute to a king.

With the philosophy of these lower races we find associated another

widely spread rite. To the savage philosopher the whole world is swarming with spiritual beings. Every man and animal has a separable soul which can go out and come back—everything has its spirit as well as its body—every tree and river, and star and wind is animated by a presiding spirit, which is not necessarily always resident in it, but comes and goes. These spirits are mostly invisible to him in his waking hours, but in his dreams he can see them far apart from where their material bodies are: either the spirits of men and things come to visit him, or his own spirit goes forth from his body and sees them. He lives among those spiritual beings in a way which only a few modern Europeans can at all realize, he goes to them for information as to what he is to do, and for knowledge as to what has been and is. And especially when he desires to hold intercourse with the spirit world, he has learnt by experience to adopt a practice which infallibly brings him into their presence—he goes for a time without food. In a short time he becomes what we should call "light-headed," and begins to see visions. When he has stayed long enough in this spiritual company, he eats, and returns to the ordinary state of a waking man. I will quote one or two accounts of this proceeding to remove all doubt as to whether this is the real purpose of savage fasting. The following details were taken down by Schoolcraft, perhaps the best authority on the habits and opinions of the North American Indians, from the mouth of an Algonquin chief:—

"Chingwauk began by saying that the ancient Indians made a great merit of fasting. They fasted sometimes six or seven days, till both their bodies and minds became free and light, which prepared them to dream. The object of the ancient seers was to dream of the sun; as it was believed that such a dream would enable them to see everything on the earth. And by fasting long and thinking much on the subject, they generally succeeded. Fasts and dreams were at first attempted at an early age. What a young man sees and experiences during these dreams and fasts, is adopted by him as truth, and it becomes a principle to regulate his future life. He relies for success on these revelations. If he has been much favoured in his fasts, and the people believe that he has the art of looking into futurity, the path is open to the highest honours. The prophet, he continued, begins to try his powers in secret, with only one assistant, whose testimony is necessary should he succeed. As he goes on, he puts down the figures of his dreams or revelations, by symbols on bark, or other material, till a whole winter is sometimes passed in pursuing the subject, and he thus has a record of his principal revelations. If what he predicts is verified, the assistant mentions it, and the record is then appealed to as proof of his prophetic power and skill. Time increases his fame. His Ke-kee-wins, or records, are finally shown to the old people who meet together and consult upon them, for the whole nation believe in these revelations. They in the end give their approval, and declare that he

is gifted as a prophet—is inspired with wisdom, and is fit to lead the opinions of the nation. Such he concluded was the ancient custom, and the celebrated old war-captains rose to their power in this manner."

In many North American tribes every man takes to himself a guardian spirit, generally some animal. And the way he finds out what animal is to be his guardian spirit, his medium, as we often call it, is to fast till it appears to him in vision. In like manner Charlevoix tells us of the practice of making children fast while the fathers are away on hunting expeditions, for they then see in dreams the souls of the animals, and divine what has happened.

In like manner we are told of the Abipones of South America, how their conjurors fast for days till they come into a state in which they seem to see into futurity. To the Hindoo mind nothing is better known than the art of bringing on religious ecstacy and supernatural knowledge, and communication with the higher powers by fasting; and the practice is known as a rite in many higher religions. In Islam, for instance, it is a strongly-marked feature; but the great fast belonged to the time before Mohammed, and was only continued by him.

Nor is the purpose for which it is practised by the North Americans or the Hindoos entirely changed;—its effects in producing mental exaltation and supposed communication with supernatural beings are still to some degree acknowledged, or at least acted upon in Europe. Its great adversary, under whose persistent attacks it is, indeed, losing its influence, is the doctor, whose system teaches him to treat what the American Indian believes to be a state of intercourse with supernatural beings, as a morbid state of mind removable by proper food. In like manner, when he finds a civilized patient seeing visions and holding intercourse with spirits, he prescribes good food and amusement, port wine and tonics. But this new state of opinion does not alter the fact that to mankind in a lower state of culture the practice of fasting is a most intelligible and matter-of-fact proceeding. An Indian goes without food that he may see spirits, with as distinct a purpose as when he eats to satisfy his hunger.

Another of the sets of practices which, prevailing widely in different states of culture, find their ready and direct explanation in the child-like mental state of the savage, is magic. Such of its proceedings as still exist among us are mere remnants of the more serious arts of ancient times, though with, perhaps, a larger proportion of mere knavery. The astrology of Zadkiel's Almanac does not appear to me to differ from the old rules; the ordeal of the key and bible is very old and widely-spread; country people still make a heart and run

pins into it to hurt the heart of some person with whom they choose to associate it, as any savage might do. But in the mind even of the modern savage these things take a different position. To his mind they are perfectly intelligible; they belong to a crude and early system of philosophy, out of which he has not grown. His theory of ideas is something much more and deeper than ours; he has arrived at the knowledge that an idea is something belonging to an object, and thence he reasons, as we have learnt not to do, that what influences the idea in his mind acts in a corresponding way on the object out of it.

If a New Zealand war-party wish to know who of them will fall in battle, they set up a stick for each, and the owner of the stick which falls will fall too. The ordeal of the key and bible is perfectly understood by the lower races, who commonly have some plan of picking out an offender which acts on just the same principle, as, for instance, the suspended sickle of the Khonds of Orissa.

There is in the world a widely spread belief that men with tails exist and are a lower kind of men, and we have an account of a South American tribe, at whose marriages it was customary for the father of bridegroom or bride to chop a piece of wood, by which symbolic proceeding he was supposed to remove the tails of any grandchildren who might be born. This is just as intelligible a proceeding as the mediæval, or perhaps modern custom of taking a saint down to the water and wetting him, that the ground may in like manner be wetted with abundance of rain. We are apt to call these proceedings by the current name of symbolism, and to think we thereby explain them. But the study of savage tribes teaches us that what we call symbolism and treat as a light half-sincere fancy of the mind, is really part of the opinion of the savage in his most serious moments, and in the midst of his highest flights of philosophy and religion. He has a doctrine of ideas out of which all these magical practices quite consistently arise; and, though we no longer hold this theory, it is, nevertheless, present among us in its effects on our customs and opinions to a degree which only careful and extended study will enable us to realize.

Of one way in which the value of the study of the lower races has been lately turned to account as a means of explaining matters which have usually been treated in that dogmatic *a priori* way which is so intensely unsatisfactory to the modern schools of natural science, I may mention an important instance in Mr. M'Lennan's researches contained in his book on primitive marriage, in which, taking his stand simply on such facts as he could find on record, he has treated the question of the laws of marriage and inheritance as belonging to a connected and consistent development from the conditions of savage to that of civilized life through the different stages of exogamy, or the

law of marriage out of one's tribe; endogamy, or the law of marriage within one's tribe, inheritance and family relationship on the female and on the male side. I do not enter here into Mr. M'Lennan's argument, nor treat it as settling and solving this great problem once for all, but rather call attention to it as a good case, where ground has been broken for the introduction of the scientific method of induction from observed facts into a district lying before almost entirely outside the range of science.

Everyone looks upon things with regard to their bearing on himself or his particular craft. Like the engineer who considered the use of rivers as being to feed navigable canals, I may venture to account teleologically for the existence of savage tribes. Among the uses of savages one great one is, I believe, that of enabling civilized men to understand themselves and their own position in the world, to work out the problem how far their own customs, laws, opinions, prejudices are the result of inheritance, and thus to learn how to separate what is good and valuable in itself from what is only held so because we have carried on the results of early states of culture into our own more advanced age.

Instead of working out in detail any particular department of this course of investigation, I have thought it more profitable to lay before the British Association some samples of its general working and character, trusting to awaken an increased interest in a kind of investigation so important, and so likely to produce immediate fruit, and which, I venture to prophesy, will, before many more years are past, have assumed the position of a great and powerful department of natural science.

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## ENGLISH SUPERSTITIONS.*

WHAT would our grandfathers have said to a book of this sort being published by the state as a contribution to English history? To men like Warburton, who reviled Tom Hearne for printing our early chronicles and laughed at Bishop Percy because he was the compiler of a song-book, it would have been simply incomprehensible that anyone could derive instruction from a mass of botanical and astrological blundering as scientifically worthless as Sibly's *Astrology* or Culpepper's *Herbal*. The same sort of men laughed at Woodward for being

* *Leechdoms, Wortcunning and Starcraft of Early England.* Edited by the Rev. Oswald Cockayne, M.A. (Master of the Rolls' series.)

curious concerning twisted stones; Priestley for his nonsense about gases; and Sir Joseph Banks for neglecting his duties as a Lincolnshire foxhunter to run after butterflies. We have now pretty nearly got rid of this kind of folly, as far as physical science is concerned, though it does still exist in a dry and shrivelled form in the brains of certain adherents of ancient methods of reasoning. These persons rarely consign their ideas to the printing-press. When they do, the more intelligent part of the community seldom become acquainted with them except through the medium of presentation copies, or of Mr. De Morgan's *Budget of Paradoxes*.

Students of history are, however, not so fortunate. The Philistines are still upon them in full force; and if they are not quite so numerous as in former days, they know the arts of word-fence far better, and are, therefore, able to hinder and annoy with much of their old success.

All men and women of average intelligence now see that the more minute facts of what we call the physical sciences are worthy of attention. They do not apply this new knowledge to the lesser facts of history because they persist in regarding man and man's works as things apart, not governed by the same laws as the rest of the universe. The prediction of eclipses, the existence of railways, balloons, and telegrams have driven the sceptics who disbelieve in any order in the universe from their old arrogance of unbelief as to the laws that govern material forces; but as the like practical results cannot be pointed out as having yet arisen from the study of the nature and history of mankind, these same persons persist in their old scepticism. With them there is no room for faith. They will not believe in the action of law one jot further than they are compelled to do by the logic of events. Their ancestors scoffed at the idea of antipodes till some of their neighbours went round the earth and came back with news of what was on the other side. When the telescope and the microscope were invented they teased their discoverers and unsettled the minds of the persons who used the instruments by telling them that what they saw in the glasses were no true representations, but deceitful and fallacious visions; and even now they try not to believe in the science of meteorology because its limits are ill-defined and its results in the way of prediction—with children the great test of knowledge—are at present uncertain.

To these people, who make up a very considerable portion of the lettered public, the use of history is simply to furnish a particular kind of amusement. With them the historian is still the tale-teller only, but degraded from his half-prophetic office, as it was in the Homeric and mediæval days, to be a mere flatterer of the religious or social

phases of the moment; an advocate or a defamer, a buffoon or a preacher, as the passion or the *ennui* of the times require.

While such continues the popular view of history, those who are anxious to get as much light as possible shed upon the past are sure to be unappreciated, to be called mere antiquaries, and to be supposed not to have any power of appreciating the greatness and glory of past times because their labours are not pictorial or romantic.

It required some amount of courage on the part of those whose duty it was to carry out Lord Romilly's great scheme for publishing the materials for the history of this country, to make that series what it is. No one nowadays could doubt the propriety of printing the chronicles. They came within the conventional idea of history, and as such the least valuable of them were thought—and rightly—to be well worthy of paper and printer's ink. It was not so with the scientific works such as Roger Bacon's *Opus Tertium* and *Opus Minus*, Alexander Neckam's *De Naturis Rerum*, and the collection of works on physical science which we are about to notice. These things are not materials for history in the old-fashioned narrow sense. They are, however, far more historical than many of the chronicles. If we look at them aright, we shall find them among the best exponents of our ancestors' manner of thinking and acting in the everyday concerns of life. They are important land-marks on our journey backwards. Like raised beaches found far inland, they are marks of the country's growth more trustworthy than fragmentary details gathered from the records of individual lives, or those few and hackneyed surface facts which writers of pictorial schools have used again and again to prove that our forefathers were sunk in barbarism or paragons of knightly honour and chivalrous devotion.

One would have thought that all persons who had passed beyond the savage state and who were in consequence open to higher influences than those of noise and glitter would be far more deeply moved by what may be faintly traced here of the joys and sorrows of home life among our ancestors, their causeless fears, their simple faith and childlike trustfulness, than by the volumes of wearisome disquisition concerning the characters of Henry the Eighth's wives or the beauty and accomplishments of Charles the Second's concubines that still pass for historical studies. The experience of book-makers tells them that it is not so.

Mr. Cockayne's task has been a difficult one in several ways. In the first place, the labour of selection was one that required very great judgment; and, as a work of this kind could only be undertaken by a person who was enthusiastically devoted to the study of ancient English literature, there was a great danger that the collection might

be swelled beyond all reasonable dimensions. This certainly has not been done. In our opinion, indeed, the error, if error there be, is in giving too little rather than too much. There was, however, another and a far more irksome duty. A rule, which admits of no exception, provides that the works printed in this series must be—like the publications of the Bible Society—issued without note or comment except what is "necessary to establish the correctness of the text." Editors may say what they like in their prefaces, but must be silent elsewhere. This is a wholesome rule, but it has pressed very hardly on Mr. Cockayne. These old books of botany and medicine are written in a language of which there are, as yet, no grammars or dictionaries that approach in any way to those we are accustomed to use when reading the languages of Greece and Rome, and the manuscripts from which the texts have had to be evolved are at least as corrupt as those of an ordinary classic. In consequence, where doubts and difficulties have occurred the editor has been unable to discuss the case at the bottom of the page. The public have by this lost much knowledge of an important and little known kind. We have also suffered by Mr. Cockayne not being permitted to trace the mythological and physical superstitions to their earlier sources, and to give us various readings of the same dreams from the folk-lore books of Germany and Scandinavia.

The curious prefaces to these volumes will be read with avidity by many persons who will not care to labour through the text, even on the translated side of the leaf. The quaint form of English in which they are written certainly does not detract from their interest or their wholesomeness. We think, however, that they ought to have been longer, and that their editor should have shewn, as the materials at his disposal gave him every opportunity of doing, that the mediæval idea of nature was—whether consciously or unconsciously it matters not—a perfect unity, and that, however unscientific in its details, a far more logical and coherent belief than the greater part of the theological and metaphysical superstitions that have grown up among its ruins. Our Saxon ancestors had no knowledge of physical law, but they had not confused themselves with the strange idea of duality—one force acting on the universe and another on man—as we have done. To them there was but one law, of which the Church Sacraments, the rains of heaven, the pestilence, and the sun-light were alike expressions. They had not learned to distinguish between miracle and nature, to call the one supernatural and the other common. Their experience of phenomena was limited, and their imaginations rich with the mingled streams of Teutonic and Scandinavian legend and Semitic culture. They, therefore, believed that all life was sacramental. That the

growth of the unborn babe, of corn, and of cattle, the force of the winds, the sea-waves, and every other accident with which they came in contact were governed by or rather were themselves the same force as that which they felt acting within their own hearts when they joined in the solemn offices or partook of the rites of the Church of God. Words matter little. It is of small import whether we call their belief sacramental or their faith naturalistic, but it is important to remember, when trying to realize past times, that our predecessors were not as we are, shackled by a dual and self-contradictory belief.

When we think of the foolish superstitions that are in full blossom around us at the present time, that flood the columns of our newspapers and stare at us from shop windows, a smile may be forgiven at the tone of contempt and pity with which some persons speak of any apparent nonsense which they do not happen to believe in at the moment. Our predecessors were at least consistent, and could give an intelligible reason for the faith that was in them.

Educated people, even, have their own superstitions, not so very different from those recorded in these books, and it is this cultured class only that has in any measure changed. The untaught peasant of to-day is more densely ignorant and quite as deeply saturated with folk-lore as the Saxon hind. He still swallows spiders to cure him of the ague, sheep's dung as a remedy for dropsy, and hangs a black-beetle, sewn up alive in a linen bag, around his children's necks to cure them of the whooping-cough. Cruelty is now, as it was then, a leading part of the popular medicine. The charms in the third volume are among the most curious parts of the collection, from the fact that they so exactly tally with certain tendencies in the popular superstitions of to-day. One of them, a charm for the loss of cattle, is not more absurd than many that are used at this very hour. All anthropologists ought to be very thankful to Mr. Cockayne for his important contribution to our knowledge of English thought before the Norman conquest. He has made a very important contribution to that heap of facts which must be gathered together ere anyone, however learned or devoted, can compile for us an exhaustive work on the comparative mythology of the Indo-European races.

## FLOWER AND MURIE ON THE DISSECTION OF A BUSHWOMAN.*

It is always gratifying, never surprising, to find the influence of anthropological inquiry felt beyond the circle of its devotees; to see men whose specialities attract them to objects of research interesting but inscrutable to a *profanum vulgus*, ready to inform us, though indirectly, about matters of anthropological moment. Comparative anatomists have necessarily pursued their study with reference, more or less intimate, to human construction, but, with a few brilliant exceptions, they have seen the culmination of their labours in the illustration of abstract "man"—an aim most laudable in itself, in results frequently unsatisfactory, inasmuch as a prime element in such comparisons, differentiation in man himself, has been ignored. Until late years, indeed, one would have gathered from ordinary text-books of anthropotomy that man is a creation of the most inflexible routine; that a specialised set of bones and muscles, for example, invariable in presence, constant in relations, erected and clothed his framework. The attention of many eminent anatomists, of whom it would be invidious to name but a few, is now, however, directed to the existence of numerous and important diversities in the soft structures of man, more especially in the muscles—but hitherto, observations of this kind have been empirical—scattered letters writing no language—and although Mr. Wood (*Journal of Comparative Anatomy and Physiology*, No. 1) indicates a philosophical want when he draws attention to the desirability of marking the correlation and rhythm of the "anomalies" observed in the ordinary subjects of the dissecting-room, it is a desideratum still more urgent to ascertain the range of such variations in racial forms. That of the typical Negro excepted, the recent anatomy of extra-European races, many of which, and those the most interesting, are passing away from the possibility of record, is well-nigh unknown. We would fain hope, therefore, that the minute dissection of one of the aberrant forms of South Africa, recently chronicled by Messrs. Flower and Murie (*Journal of Comparative Anatomy and Physiology*, No. 2), is the commencement of systematic research into racial structure. Should it prove so, its great intrinsic value will be enhanced.

The subject examined was, we gather, a girl of about twenty-one years of age; in life possessed of "a fair amount of intelligence";

* *Journal of Comparative Anatomy and Physiology*. Macmillan and Co. No. 2, May 1867.

"speaking English" and "playing the piano" being not the highest, we presume, of her intellectual credentials. "In general outward appearance she bore evidence of being a genuine example of the Bushman race, agreeing in all the essential particulars with the 'Hottentot Venus,' as described by Cuvier." At the time of death the gluteal hump was very subdued, "still the fat of the buttocks was fully one inch and a quarter in thickness, and the skin over it had a remarkably loose, flaccid, and wrinkled character as if at some previous time it was more fully distended." It is remarkable that Cuvier (*Mem. du Mus.*, p. 268) describes these accumulations of fat as having "a striking resemblance to those which appear in the female mandrills, baboons, etc., and which assume at certain epochs of their life a truly monstrous development." This statement, however, does not seem to have been confirmed, and in the female macaques and cynocephali that have come under the writer's observation the spareness of glutæal adeps usual in the monkeys has not been modified.

The memoir is enriched with an elaborate series of external measurements of the body and a comparison of the proportions of its projected outline with those of the figure given by Carus. Hence the authors deduce—"That in the Bushwoman the head is slightly longer, the shoulders are placed much higher, the arms are very markedly shorter (three inches), the legs slightly longer (half-an-inch), the umbilicus placed somewhat higher, the shoulder narrower, but the thorax is nearly equal in breadth, while the pelvis is considerably narrower—this disproportion of pelvic breadth, however, being less marked opposite the trochanters. The principal peculiarity then in the Bushwoman appears to be the shortness of the upper extremities, which is also well expressed in the distance from finger tip to finger tip of the outstretched arms—this distance being fully two inches less than the total height of the individual, instead of equal to it, as is commonly the case in the European." We must not, however, view this brevity of the arm as a race character, for, as might be expected from Negrine analogies, it is, on the Authors' own showing, an individual peculiarity; three Bushmen tabulated by them giving measurements of the arm as compared with the total height similar to those of the Negro. Contrasted with these, an individual contraction of the arm to the extent of one or one-and-a-half inch less than in the average European would appear stranger if we were unprepared to find that in their very deviations these races exemplify the infantile characters of higher types; "On comparing the proportions of the segments of the limbs with the mean of those of numerous individuals at various ages as given by Humphry, we are struck with the remarkable agreement between them and those of the European child between four and six years old. It would,

indeed, appear as if the proportions of a child of that age had been permanently retained." The comparative height of the shoulders deserves more notice than it obtains; from the measurements given it evidently resulted, not from the elevation of the scapula upon the ribs, but from an absolute shortening of the cervical vertebræ, an obvious simious character. A trunk tapering downwards from the chest is, moreover, suggestive of the pithecoid outline.

Another curious peculiarity presented itself in the length of the hallux. "The great toe," say the authors, "is rather the longest, but such," they add, "is the case in many individuals of the higher races, although, according to the canons of ancient art, it should be shorter." As a general rule, a short hallux is undoubtedly a retrograde character, and the difficulty thence arising in respect to the Grecian model is explicable only on the supposition that the stock of the Greek tribes, whatever or wherever it might have been, had this mammalian characteristic more pronounced than its neighbours. The salient points of artificial beauty are everywhere exaggerations of natural conformation; and it is not surprising to find even in the highest races outcrops of the archetype in directions nowise affecting the rank conferred upon them by their totality of organisation. Though the existence of a long hallux is limited by the authors to "many individuals of the higher races," it is difficult to see the grounds upon which it is rendered the exception and not the rule; as amongst ourselves, at least, it clearly appears to be. At all events, it is sufficiently obvious from the table previously referred to that the length of the great toe in the subject under examination is foreign to the race. In the three Bushmen an average femur of 27·78″, and tibia of 23·89″ (per centage of total height), give a foot of 13·78″, whereas in the woman a femur of 26·49″, and tibia of 21·08″, yield 13·87″ as the length of the foot.

Our knowledge of the physiognomy and sense organs is in many particulars rendered more precise than heretofore. On the other hand, the direct contradiction given to previous describers of the hair-growth is somewhat perplexing. "On a careful examination of the scalp, it was ascertained that the hair did not grow in distinct patches with bare intervals, as has been asserted, but the roots were evenly scattered—the aggregation into tufts being due to a peculiar tendency in the hairs themselves." The testimony of Barrow and others would be no insuperable obstacle to our acceptance of this statement, were it not confirmed by an express declaration like that of Parsons, who says that in the subject dissected by him "the hair lay in little distinct compact curly tufts twisted spirally, and in the intervals of these tufts the skin was distinctly seen." In this inconsistency of observation we must await further information. The breasts were, as usual, "soft, flaccid,

and subpendulous," their antematronal condition showing that the great length ultimately attained is of congenital derivation.

One point, at least, the authors may be considered to have set at rest. The value of the tablier as a natural character of South African Negroids has been so often depreciated that a decision of the question is of much importance, and this we seem to have obtained. "The sides of the prepuce (clitoridis) were prolonged down into the nymphæ, which formed largely developed, lax, pendulous, triangular lobes of a dark purplish brown colour, which, in a relaxed condition, measured 1·2″, but they admitted of considerable extension. The remarkable development of the labia minora or nymphæ which is so general a characteristic of the Hottentot and Bushman races, was sufficiently well-marked to distinguish these parts at once from those of any of the ordinary varieties of the human species, although they had not attained that extraordinary extent attributed to them by most authors.

"In reference to this subject, the following communication, received from a scientific friend residing at the Cape of Good Hope, upon whose testimony perfect reliance can be placed, may be of interest to the anatomist.

"Two pure-bred Hottentots, mother and daughter, were the subjects of examination. In the words of our correspondent,—'The daughter was first examined. She is about twelve years old; the glutei muscles are covered with the prominent peculiar hemispherical cushions of fat common to the tribe, and the mammary development is commencing. On standing up, two thongs of about the thickness of a cedar-wood pencil hang down from the pudendum, exactly like strips of sheep-skin slightly twisted and apparently vascular. On separating the labia these appendages are found at once to be the nymphæ elongated, the base or attachment about half the area of what they might be expected to cover, the slight twist commencing immediately at the attachment, viz., within the pudendum. The total length of the appendage from the base to the end exactly three inches and a half. The hymen perfect. The diameter of the circular aperture to the vagina about a quarter or a third part of an inch.

"The mother had the usual falling off appearance of youth of the Hottentots of thirty years old. Mammæ flaccid and elongated. She took up her appendages, leading the right one round the right side above the gluteal projection, similarly, the left one round the left side, their ends met at the spine! I am now perfectly convinced that the organisation is natural and congenital, and not produced, as has been supposed, by the degraded and filthy habits of the tribe."

The examination of the muscular system yielded some important results, notwithstanding that the authors sum up their notices of it

by saying—"On referring to the absolutely differentiating characters laid down by Professor Huxley, we find that in no case does our subject pass over the boundary line. We also find that in no one of the numerous variations does the approach to simian characteristics actually exceed that which has occasionally been met with in the white races of man." This mode of estimating differential characters is objectionable. Given a human form, evidently inferior in its general organisation, and possessing in its myology, for example, half-a-dozen simian characters, each of these, or even two or three of them together, are occasionally found in individuals of a higher type; therefore, their concentration in the lower man has no biological value. The conclusion stated or implied is a *nonsequitur*. It is an undeniable principle that in proximate affines distinguishing characters are proportionately instable. Taken as a whole, the human group is composed of members closely allied; their discriminative characters are, therefore, vacillating. It is clear, then, that as between race and race the value of differentiations depends on the majority of instances, and that this value is totally unaffected by a few instances occurring elsewhere. Again, human animalisation partakes necessarily of brute characters, but partakes of them more or less, both individually and racially. As between man and beast, therefore, our estimation of a ferine character found in any race should proceed upon its persistency in that race, or upon its association with similar or higher developments. The authors, indeed, trembled on the verge of a concession which would have been fatal to the latter part of their statement. "It is, however, interesting to observe, that in the very significant arrangement of the flexor tendons of the foot, the tendon of the flexor hallucis, giving a branch to the fourth as well as to the second and third toes, and part of the flexor brevis arising from the tendon of the long flexor, on both feet alike, the deviation from the specially human condition of these parts is as fully marked as in any case hitherto recorded;" and this case, be it observed, occurring at the bottom of the human scale, and in the single instance examined by them. "Whether this is in any way characteristic of the inferior races of the human species, or a mere coincidence, remains to be determined by future observers." We cannot help thinking that such a coincidence would be a strange vagary of chance. The omohyoid presented itself in a very interesting condition. Of this muscle, which in man generally is biventral, and preserves its intermediate tendon in the chimpanzee, but loses it in the lower cheiropods, there exhibiting but rarely a few glistening fibres, we read,—"The muscular fibres in ascending the neck had no appreciable tendinous intersection, but were enclosed and bound down by fascia so as to produce the bending or angular change of direction, which, however, was less marked than

usual." It would almost seem that the troglodyte condition of the muscle is an interpolation between that of the lower pithecoid and the lower human. The other muscles giving indications of degradation were a distinct cephalo-humeral, developed almost to its condition in the carnivora; a glutæus externus, "thin, flabby, and badly developed"; and an occipital group of noticeable strength, not by any means to be expected in such a subject.

The brain was light, weighing but thirty-eight ounces. Whether any part of the deficiency is attributable to exhaustive disease we shall, perhaps, learn from Mr. Marshall, to whom it has been committed for examination, and whose investigation we await with interest. The usual cause of death was apparent. "The whole of the left lung was firmly adherent to the thoracic walls; there were also some slight adhesions on the right side. Both lungs contained abundance of tubercular deposit; the left had several large cavities filled with purulent matter. The distinction of the lobes was completely obliterated by adhesions." The fatal strain upon the respiratory system of the imported Negro or Negroid seems generally to involve the alimentary in its effects; in the present subject the intestinal tract was pervaded by tubercular ulceration.

On the whole, Messrs. Flower and Murie's dissection amply confirms the Bushman in the rank, both racial and biological, to which he has been assigned by common consent,—that of a divergent Negroid on the very confines of humanity.

We may not, perhaps, be able to accept every observation noted in this memoir as equally valuable to comparative anthropology, but the reserve does not diminish our obligation for a laborious examination and candid record of the features presented to its authors. Such opportunities as theirs have hitherto been of angelic rarity. We can only hope that they will become more frequent and be used as thoroughly.

C. W. D.

## GERMAN ARCHAIC ANTHROPOLOGY.*

We have great pleasure in bearing testimony to the zeal and ability displayed by our continental friends in their archæological researches. They are pursued not only with indefatigable industry, but with an enlightened perception of the benefits which their discoveries may confer on archaic anthropological science; and whilst enriching their public and private collections with antique objects of rare interest and value, they are accumulating data for the study of ancient races, and providing means of comparison by which their identity or diversity may be established. And this private enterprise seems to be duly appreciated and seconded by the liberal support of public bodies; not antiquarian societies alone, whose duty it would be to give their assistance, but municipalities and provincial governments liberally contribute to promote the work. This is as it should be, and England might profit by their example, and not allow researches of great interest too often to fall into neglect and abandonment, simply because in this utilitarian age, the persons who possess the means do not possess the taste and inclination necessary to induce them to afford the resources which individual enterprise has not always at its command. There are exceptions, we are glad to say, but *Cui bono?* is too frequently the answer given to a request, when a little unselfish assistance might be productive of most useful results. The Anthropological Society has in a liberal and right spirit established a separate fund for the encouragement of archæological explorations, more especially in the Celtic field, persuaded that this is the only way of arriving at definite conclusions on certain questions of racial import which are at present in a somewhat unsettled state. Our foreign *confrères* are also as fully alive to the importance of the results derived from the labours of British antiquaries, as we are from theirs, and it is by this reciprocity of interest that science must ultimately reap the benefit of more accurate definitions. We recently noticed in this Journal Mr. Warne's work on *The Celtic Tumuli of Dorset; The Revue d'Alsace* (Feb. 1867) has an article on the same work, by the author of *Tombes Celtiques d'Alsace*, who therein observes that the Dorset tumuli resemble those of the valley of the Rhine, and particularly some that were in-

* *Das Alamannische Todtenfeld bei Schleitheim und die Dortige Römische Niederlassung.* Von Dr. Martin Wanner, Staatsschreiber. Schaffhausen, Druck und Verlag der Brodtmann'schen Buchhandlung, 1867. "The Alemannic Burialgrounds and the Roman Settlement near Schleitheim". By Dr. Martin Vanner, State-Secretary, Schaffhausen, 1867. (Plates.)

vestigated by Colonel de Morlet at Mackwiller in Switzerland. Tumuli also in Saxony, and the lake settlement at Meilen in Switzerland, have produced urns, implements, and weapons corresponding with those which have been found in the tumuli of Wilts and Dorset (Keller).

The work to which we now invite attention is one of very decided ability, embracing the description of discoveries recently made in the Roman settlement, and Alemannic Cemetery at Schleitheim, near Schaffhausen. With the latter we are chiefly interested as affording some points of comparison with the Frank- and Anglo-Saxon burial grounds of France and England.

The village of Schleitheim is situated in a fertile luxuriant valley between two chains of hills that extend into the Black Forest. It seems to have been known to the Romans as the Station Juliomagus, on the road from Vindonissa (Wendisch) to the Danube ; one of those important military posts of Gallia Belgica that were intended to secure their conquests on the right bank of the Rhine, and to be made the basis of their operations in the subjugation of Germania. The district was occupied by the Imperial Roman power at a very early period. In the reign of Augustus, Drusus settled the Agri Decumates, as they were called, the lands situated between the Rhine and the sources of the Danube, which, according to Tacitus, were in his day peopled by Gauls, not by Germans ; and these borderlands remained under the Roman power in the time of Probus, after which they were lost. The fierce Teutonic race inhabiting the country bordering on the right bank of the Rhine, waged an unceasing warfare with the invaders from the commencement of the third century, and after a succession of defeats and victories succeeded in dispossessing them of the territory, so that by the end of the century they had established themselves in the whole of the country extending from Mayence to the Lake of Constance. In the time of Constantine the Great the lands between the Rhine and Danube were theirs, and from about the middle of the fourth century no other people but the Alemanni were settled on them, with the exception, perhaps, of a small remnant of Gallo-Roman population. These are the people whose remains have been brought to light in the cemetery at Schleitheim, the date of which may be assigned to a period from about the middle of the fourth to the end of the seventh century. Of the Alemanni we know nothing more than they were a branch of the Germanic race ; their natural affinities in the genealogy of nations is one of those problems, which researches, like those of Dr. Vanner, may help the anthropologist to unravel.

This Alemannic cemetery was accidentally discovered during opera-

tions consequent on the formation of a new burying-ground for the village of Schleitheim, in 1865; and in the following year researches were systematically carried out amongst the graves. One hundred and eighty of them were thus explored, and many more left unexamined. The cemetery extends along the slope of a hill; the graves are arranged in rows, but not in the direction of the valley which is north-east, but lie due east as by compass; the skeletons which they contained belonged to both sexes and to all ages, and sometimes as many as four were found in the same grave; they lay horizontally, none deeper than $2\frac{1}{2}$ feet from the surface, measured generally from 5 feet 3 inches to 5 feet 6 inches, and were so much decayed that Dr. Vanner succeeded in reconstructing ten only of the skulls, of which we shall presently give his own description. In one instance only were there any vestiges of cremation with the interments. The graves were uniformly constructed with slabs of rough or hewn stone, and some of them were covered with broad stone slabs, and the stones were laid in mortar. Some of them had floors of cement, and there were fragments of Roman bricks and tiles found. The objects deposited with the bodies, and which are now in the museum at Schaffhausen, consisted chiefly of iron knives, swords, and buckles; three iron spurs were found; a few rings and ornaments of silver; rings, armlets, earrings, belt-mountings, in bronze; beads of amber, clay, and glass; a horn comb; a few coins of Constantine, Tetricus, and Decentius. The swords were of two kinds; the short, single-edged blade, about 18 inches in length, which is known as the *scramasaxus*, of Gregory of Tours, or the *semi-spatha*, and resembles swords found in the Saxon graves of Kent, in the Frank graves of the valley of the Eaulne in Normandy, and at Selzen in Germany; probably the "breves gladii" of Tacitus. The other kind has a broad, double-edged blade, 2 feet 6 inches in length; is comparatively rare, but has been found both in France and England; the *spatha*. The knive is found in almost all the Saxon graves of Kent. The strap, or belt mountings, are of the same type as those obtained from the Kentish graves, and the Frank cemeteries of Normandy; but these are not so artistically finished, nor so richly ornamented as those from Kent, nor did the Alemannic population seemingly possess any of those splendid circular fibulæ, for which our Saxon graves are so justly celebrated. In the disuse of the custom of cremation there is an analogy with the Franks and Saxons; and since Mr. Kemble states that cremation was a universal Teutonic institution, we must infer that its discontinuance is to be ascribed to a religious influence superseding the ancient Pagan superstition. Dr. Vanner observes, that at first he considered this the cemetery of a mixed Roman and Gaulish population, but was

led to abandon this view for reasons with which we entirely coincide. There is a complete resemblance between these graves and their contents with those discovered at Bel-air, near Lausanne, described by M. Troyon; with those of Selzen, described by M. Lindenschmit; and with those of the Alemannic cemetery at Ulm, by Prof. Hasler; to which we may add their analogy with the Saxon graves of Kent, and the Frank cemeteries of the Vallée de l'Eaulne, described by M. l'Abbé Cochet; these again are assimilated by their learned explorer with the graves of Selzen and Bel-air; hence the conclusion seems inevitable that they all belong to one and the same race, widely diffused, diverse in appellation, but probably contemporaneously existing.

Now let us advert to the craniological evidence afforded by these researches. The author reminds us that four types of skull have been found in Switzerland, and named by His and Rütimeyer from the places where they were first discovered, viz., Sion, Hochberg, Bel-air, Dissentis.

"The Sion type is specially found among the few skulls of the pile buildings, the graves of the Celto-Helvetic, and the Helvetic-Roman period in the old Alemannic graves. The Dissentis skull is in majority among the skulls of the present ossuaries, in which the Sion type is but sparsely represented; but everywhere are found a moderate number of intermediate forms."

He distributes his ten skulls in four groups. The first group consists of skulls Nos. 1, 2, 7, 5, 8. They belong to dolichocephali.

"They are characterised by the gentle curve of the cranial roof; the forehead, more or less straight but not high, passes into a lightly arched vertex, which descends without abruptness into a well-developed rounded occiput, projecting supra-orbital ridges; the top of these skulls presents a broad oval form with a strongly developed occiput.

*Measurements in Centimètres.*

| | Length. | Height. | Breadth | Ht.—length index. | Bdth.—length index. | Ht.—breadth index. |
|---|---|---|---|---|---|---|
| 1. Cranium nearly perfect, without face | 19·2 | 13·3 | 14·6 | 69·2 | 76·8 | 91· |
| 2. Cranium, base wanting | 18·5 | 13·3 | 14·2 | 71·8 | 76·7 | 93 6 |
| 7. Defective cranium | 17·5 | — | 13·1 | — | 74·8 | — |
| 5. Face and base wanting | 19·4 | 13· | 13·9 | 67· | 71·6 | 93·6 |
| 8. Cranium nearly perfect | 18·7 | 13·7 | 13·5 | 73·2 | 72·1 | 101·4 |
| Mean | 18·6 | 13·3 | 13·8 | 70·3 | 74·4 | 94·9 |
| Mean of Sion skull after His and Rütimeyer | 18·7 | 14· | 14·4 | 74·9 | 77·2 | 97·1 |

"The description of the form, like the measurements, gives the

characters of the Sion type (moderately dolichocephalic). No. 6 is the skull of a man of powerful osseous structure. Between the legs lay a double edged sword. The anterior part of the skull shows, in the strongly developed supra-orbital ridge, the finely arched forehead and vertex, the Sion type; but the posterior part of the head is broad, and the vertex descends with an abrupt curve, almost angular, into the occiput. This skull combines the characters of the Sion with the Dissentis type; it is a Sion-Dissentis cross. The characters of the almost cubical, pure Dissentis skull are, according to His and Rütimeyer, its shortness and breadth (brachycephalic); the flattening of the occiput and its almost rectangular dropping off from the vertex and the base.

*Measurement in Centimètres.*

| | Length. | Height. | Breadth | Ht.—length index. | Bdth.—length index. | Ht.—breadth index. |
|---|---|---|---|---|---|---|
| No. 6 | 18·5 | 14·5 | 14·7 | 79·3 | 78·4 | 98·6 |
| Dissentis skull, after His. Mean | 17· | 13·9 | 14·7 | 81·8 | 85·5 | 94· |

"Nos. 4 and 9 much resemble each other, but differ from the rest. No. 4 is a female skull of the Sion type; No. 9 is probably the skull of an aged female.

*Measurement.*

| | Length. | Height. | Breadth | Ht.—length index. | Bdth.—length index. | Ht.—breadth index. |
|---|---|---|---|---|---|---|
| No. 4 | 18· | 14· | 13·1 | 77·7 | 72·7 | 106·8 |
| No. 9 | 18·5 | 14·7 | 13·4 | 79·4 | 72·4 | 109·7 |

"Despite some similar features these two skulls differ from the Sion type, especially by their height with moderate length; neither do they belong to the Hochberg form. For the present they are isolated among the forms found between the Rhine and the Alps. Deviations from the typical forms resting perhaps on accidental, not normal development are represented by the following two skulls.

"No. 3. The forehead ascends at first rather straight and then passes with a projecting arch into the vertex. The latter shows at the beginning of the sagittal suture a slight notch; the top of the vertex inclines a little back. The occiput much developed in length, somewhat flattened on the sides, and has therefore, viewed from above, a pyramidal facetted shape. This skull might be taken for a Hochberg skull, so much does it resemble this type; but this is contradicted by its moderate length and height; whilst the Hochberg skull is, on the contrary, distinguished by the magnitude of these two diameters in proportion to the small breadth (very dolichocephalic).

"No. 10 has a straight orthognathous face, strongly developed superciliary arches, with a strikingly long, somewhat broad and flat-

tened vertex. The height and breadth are in proportion to the length, but slight; hence the skull appears compressed. Both may be abnormal natural development.

*Measurement.*

| | Length | Height. | Breadth | Ht.—length index. | Bdth.—length index. | Ht.—breadth index. |
|---|---|---|---|---|---|---|
| No. 3 ..... | 18·4 | 12·9 | 13·2 | 70·1 | 71·7 | 97·7 |
| No. 10 ..... | 19·5 | 13·3 | 12·8 | 68·2 | 65·2 | 103·2 |

"The majority of the skulls hitherto found belong to a type which predominates among the preserved skulls of the early and earliest Helvetians, but which also are found in many Alemannic graves; therefore the Alemanni and the Celtic Helvetians in many instances present the same cranial shape. The characteristic Dissentis skull is not found in its pure form, and one form was found hitherto not met with in the graves between the Rhine and the Alps."

It would be desirable to compare these measurements and characters with those of the skulls from the Frank cemeteries of Normandy, now deposited in the Natural History Museums of Paris and Rouen, and in the collection of Dr. B. Davis. In a science like anthropology every fact is of value, but hasty generalisation should be religiously eschewed.

## QUATREFAGES ON THE POLYNESIANS AND THEIR MIGRATIONS.*

In this valuable addition to the literature of comparative anthropology M. Quatrefages has undertaken the exposition of one of the most difficult problems connected with the *origines* of the dark-skinned races of the Southern Ocean. It will be remembered, and must, in fact, be borne in mind throughout the whole of our study of what M. Quatrefages now submits for our consideration, that this distinguished anthropologist has definitely given in his adhesion to the monogenistic theory. This present contribution to our knowledge he plainly states is partly made for the purpose of supporting and confirming the arguments employed in his work on the *Unity of the Human Species;* and it therefore, to some degree, assumes a polemical position, and is open to fair and proper criticism. The main question opened up in this

* *Les Polynésiens et leurs Migrations.* Par M. De Quatrefages. Paris, 1866.

volume is the "old old story" of the variability or invariability of type in man; it is again the old battle-field of human hybridity that we have to traverse, and the author, to his own satisfaction at any rate, replies with confidence, that the Polynesian races are mixed, are not indigenous to the region they occupy, that they have come from the eastern archipelagos of Asia, and that their anatomical and physiological constitution presents evident traces of intermixture of negro, white, and yellow parentage. Indeed, M. Quatrefages is so confident, that he says there is no doubt of the Polynesian race being "metisse," that is to say, "that it has been formed by the crossing of populations very different in their physical characteristics." Nay, more than this, he declares that this may be proved by reference to the skeleton of the Polynesian race, "where the negro, the white, and the yellow man appear, in turn, or simultaneously, to have left their imprint." This bold assertion is somewhat difficult to understand, as a simultaneous action of three races in producing one skeleton would lead us to compare the product with Mrs. Malaprop's definition of Cerberus, "three gentlemen at once," or, at least, with Sir Boyle Roche's celebrated bird —that occupied two portions of space at the same time.

But rather let us allow M. Quatrefages to speak for himself on this question of osteology. He observes (pp. 6-9) :—

"In a head of a Tahitian belonging to the Museum, and which may be regarded as a fine type of the race, the cranium, properly speaking, is high, moderately elongated from the back to the front; the curve which it describes from the forehead to the occiput is at first regular, but is abruptly flattened behind. The parietal bones at the sides of the skull are very slightly marked. The forehead is somewhat retreating, although the frontal bone is well-developed. The orbits are moderately extended, the cheek-bones slightly salient, the bones of the nose are raised, and of a medium development. The superior maxillary is slightly projected, or, in other words, it is a little *prognathous*, and offers somewhat of a massive character; the inferior maxillary is curved beneath, and also presents a slight tendency to prognathism.

"The entire sketch (continues M. De Quatrefages) which I have here given leads us to suspect the fusion of the characteristics met with in the white, the yellow, and the black, and the result is a mutual effacement and a reciprocal softening of these features. On the other hand, in other skulls much more marked peculiarities are to be distinguished. In one appertaining to an autochthon (*indigène*) of the Marquesas group—the general form of the cranium tends to that found in the Hindoo—the forehead is high, the bones of the nose are salient, the superior maxillary retreats and the under-jaw does not project. In this the characteristics of the white race are evidently in relief. In other heads, on the contrary, coming either from the same locality or from other places, the cranium becomes longer and more retreating, the osseous promontories become more salient—the forehead is very

retreating, the brows are very marked, the cheek-bones protrude; the nasal bones, small and concave, resemble those of the Hottentots, and the projection of the jaws and of the teeth is as marked as in the purest negro. Here the predominance of the Melanesian negro type becomes incontestable. If, from osteological characteristics, we pass to those furnished by the living man, a complete concordance is to be found. The cranial region is generally high—somewhat short from back to front, and flattened in the rear. (This, however, is artificial.) The forehead, well developed, but generally rather low, often is very handsome, and the facial angle concords with that of the European. Usually the nose, although a little too short and flattened by the manipulation received by it in infancy, is straight and salient, in some islands it is almost always aquiline, a character essentially belonging to white races. The eyes are rather small and are almost always horizontal, rarely oblique; their colour is almost always black. The cheek-bones are more salient in front (as among certain white populations) than at the sides. The mouth is well marked and its expression is agreeable, although the lips are a little too thick, and usually present that peculiar basement which is evidence of an infusion of negro blood; but sometimes they are fine and small, as in the European. The chin is often protruded in an exaggerated manner, and then becomes narrow and pointed. The complexion varies from a very pale inky yellow (reminding us of Southern Europeans) to a dark brown, passing further into a copper tint. Finally, the black, or dark brown, or light brown hair has a general tendency to roll up into curls, and is often sufficiently crisp, but never woolly."

M. Quatrefages next draws attention to the fact that the traveller Quiros, who was the first to touch at Tahiti in 1606, was struck by finding a chief there with red hair. When Wallis rediscovered this island in 1767 he found individuals with red, and even fair hair—this was usually the case in children of both sexes. To these facts M. Quatrefages attributes great importance. These fair individuals, discovered in one of the most remote archipelagos of Polynesia, at the epoch of their earliest discovery, could not have resulted from a recent intermixture with Europeans. They were pure-blooded autochthones. "Now," continues the author, "all white populations belong to the most characteristic branches of the great white race, and the presence of individuals of this description at Otaheite proves that white blood had reached as far as that place; and, though it only presents itself in its most marked character among the chiefs, it is because they watch over the purity of their caste with a care pushed almost to cruelty. Here, then, we should seek the traces of the white element, as we must look for the negro or yellow elements in the inferior classes of their society."

In the Solomon Islands, Mendoza and Mindana found similar persons amongst negro populations. Quiros did the same in the New Hebrides,

and Roggeween found *white* persons at Easter Island in 1772 among mixed populations. In the Bauman Islands, Roggeween states the populations to be white, not differing *inter se* more than European individuals—probably basing his comparison upon the personal peculiarities of his own countrymen, natives of Holland. From this M. Quatrefages concludes that it is an incontestable fact that the white element existed in the islands of Polynesia anterior to European discoveries. But it is somewhat of an assumption to decide in this manner, and we should rather leave it for the investigation of anthropologists in general than draw inferences from these few isolated instances, although they may bear the authentication of eminent names. In order to properly judge of the migrations of the Polynesians, we require a far more accurate knowledge of the tidal phenomena of the Southern Ocean than we at present possess. It would seem to be very fairly established that the Malays have for long periods of time been voyagers; but in no instances of a well attested character do we find permanence of organisation resulting from chance unions. It is here that we join issue with M. Quatrefages, and at the same time declare that we have not facts enough to decide either way. Opinion would incline to plurality of races—such evidence as we possess would strengthen this opinion and render the inference incontestable—that the human races are really indigenous to their various centres of culture, and that the exceptions alone furnish anthropological instances of variation in type. Such reasoning has received the sanction of many eminent anthropologists, and is entitled to at least as much courteous consideration as the prior view, adopted by M. de Quatrefages.

When Japan was first conquered by a superior race, it was not, if we may trust historians who had no apparent interests to serve in putting forth inaccurate statements—destitute of inhabitants; the islands were found populated with a dwarf race, of inferior capabilities of mind and body. Is it not likely that these were autochthonous, and the civilisation they had accomplished was the result of their own gradual development? A recent eloquent and philosophical writer has well said, that "similar ideas and similar usages make their appearance spontaneously in the progress of civilisation of different countries; showing how little they depend on accident, how closely they are connected with the organisation, and, therefore, with the necessities of man." And he adds, speaking of the autochthonous populations of America, "with difficulty do we divest ourselves of the impression that there must have been some intercommunication; each was, however, pursuing an isolated and spontaneous progress."* These observations we may appositely apply to the question of the Polynesian populations and their *origines*.

* Draper's *Intellectual Development of Europe*, vol. ii, p. 170.

A curious question is raised in the course of the argument of M. de Quatrefages. Dr. Pruner Bey has stated "that the Polynesian language (?) is the most emasculated language in existence." In what way such a fact could aid in the elucidation of the physical origin of the races of Polynesia it would seem difficult to understand. And the assumption that the earliest settlers from Asia, as brought forward by M. Quatrefages, should rather have selected Samoa and Tonga than islands nearer the coast of Asia, does not help us; and yet M. Quatrefages assumes the existence of a different and aboriginal race in these islands. Does this not practically defeat the learned author's main argument? If in any one portion of the globe we find it admitted that there has been discovered a race possessing a definitive osteological and physiological basis of its own, the question between monogenists and polygenists must come to an end. And such an admission as this from so eminent an anthropologist seems likely to tend to such a result, although in the face of the theory adopted by him.

Science on this point is yet silent, and this most interesting of all questions remains to be elucidated by an appeal to facts, and cannot be settled except we are furnished with more evidence.

There are many important chapters in M. de Quatrefages' work, to which we have not space at present to advert; and, while it is impossible to coincide in the inferences drawn by the author, the book cannot but be considered a most valuable addition to anthropological literature.

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## ON THE PRIMITIVE PERIODS OF THE HUMAN SPECIES.*

We now come to the caves, where the finds are much more important. First of all, we have to thank M. Fuhlrott for having furnished us with a more correct determination of the age of the Neander skull. All the nonsensical theories propounded concerning this skull are thus upset by one blow; and the Neander skull is placed in the same category as to age with that of Engis, the antiquity of which is definitely fixed. We must, at the same time, in opposition to such anthropologists as do not pay the necessary attention to geological facts, assert that these—the oldest skulls we know of, excepting, perhaps, the Moulin-Quignon skull, not yet examined—are most decidedly dolichocephalic. Since the theory derived from the Northern stone men, that the first inhabitants of our continent were brachycephalic, has still some ad-

* *The Primitive Period of the Human Species.* By Carl Vogt. Continued from No. xvii, p. 221.

herents and defenders, it may not be superfluous to call this fact to mind which upsets that whole theory.

The geological character can mostly only be established by particular attention, and even then, but imperfectly. It is already difficult to acquire a correct notion of the mode in which the cave was filled. There is no doubt, as proved by flints, lehm, and sand in the deposits, that water has been the great agent. Most observers are, however, too much inclined to assume tumultuous water streams, even in cases when slow infiltration may have produced the same effects. The observations on infiltration into stone coffins, the dislocation of corpses from their relative position by the intrusion of sand and earth, the introduction of flints through cracks, and even into the cranial cavity as shown by Broca and others, may be applied also to caves. I already observed in my *Lectures on Man* that the filling up of the bear cave at the Stooss in Schwytz, with a light earthy material, and that at a spot where rills neither exist nor existed, that such fillings of caves may be effected by atmospheric waters, without any violent commotion, but very slowly and gradually by the imperceptible descent of earthy and pulverised particles, including even flints and rubble.

Steenstrup, with much acuteness, and assisted by the abundant materials existing in Copenhagen, has lately given us an important contribution towards the determination of the geological character by showing that a number of changes occurring in the bones found in caves, diluvial formations and osseous breccia were not, as formerly believed, the effects of the water nor of the handling of man, but are solely to be ascribed to the teeth of beasts of prey. In comparing thousands of bone fragments from kitchen-middens, caves, and breccia, Steenstrup was first surprised by the almost constant absence of vertebræ, so that amongst several thousand fragments of femoral bones not one vertebra was found, and that other bones are always injured on the same spot; the long bones, for instance, in the articular processes, while others again, the horizonal ramus of the lower jaw, for instance, are always to be found. What he had observed in the north he found confirmed in the bones of the south brought to day-light from the caves of Montpellier by Marcel de Serres and others. Here, therefore, we possess a general law, the law of injury, the cause of which is easily ascertained by experiment. All beasts of prey gnaw the bones of a mammal or bird of a certain age in the same manner, by rejecting the more solid parts, but keeping to the spongy portions which contain fat and are covered by cartilage and muscular attachments. The bones of young animals, which offer no great resistance to the teeth of the beast, of course, form exceptions. Man, on the

other hand, treats bones quite differently. He first breaks the long bones—despised by the animal—in order to get at the marrow, or he shapes them to implements. Damp air and alternating dryness effect other lesions, such as cracks and chinks, which may induce the splitting of bones. Steenstrup was thus enabled to show that the bones of the caves of Montpellier which Marcel de Serres believed to have been acted upon by the waters, had really been mutilated by beasts of prey, and that the filling of the caves had been effected by the bones being dragged in. He also showed that the bones open on both ends, which Boucher de Perthes believes to be handles to fix upon the hatchets, had been prepared by beasts of prey and not by man, and that, finally, the clefting of the bones found in the breccia of Nizza and Ortibes was the result of their long exposure to the open air. On looking at the figure of the skeleton of an ox, upon which Steenstrup by shading has represented the respective influences of man and beasts of prey upon the separate bones of the animal, it appears to me as if the mutilations of the lower jaws of bears of the cave of L'Herm which Garrigou holds to be primitive implements formed by the hand of man, and for which I then knew no better explanation, are equally the effect of gnawing, perhaps by surviving bears.

Those caves are of special importance which present a distinct stratification of their contents, and in these strata bones of distinct species of mammals. For, as already observed, it is not of so much importance what may be found in a cave, but in what position it is found. Caves may have been filled up by gradual deposits in an earlier or later epoch, entirely or partially; the deposits of earlier epochs may have been disturbed and intermixed with the deposits of later epochs. Man may himself, by inhabiting or burying his dead in caves formerly inhabited by beasts of prey, have caused such intermixtures in partially filled up caves. It also becomes necessary to note the condition of each bone, and in what position one or another piece is found. If this be neglected our labours may be in vain. Thus, a M. Bourgeois examined a crevice at Caves, near Amboise, which presented three different deposits. At the bottom, clayish marl, with many and large bones; in the middle, yellow clay, with very few bones; on the top, sand and rolled stones, with many small bones. This collection consists of bones of the cave hyæna, cave tiger, cave wolf, fox, badger, weasel, mole, horse (probably the extinct *Equus Adamaticus*), fossil rhinoceros, wild hog, urus, peat stag, and also some frog and fishbones, including some fresh-water shells. But with such a most interesting collection of bones, the unfortunate possessor cannot tell us in what stratum he found either of these species; whether the horse bones lay side by side with those of the cave tiger

or not, so by this want of attention the whole find is almost without value.

In advantageous contrast to such neglect stand the explorations of the Marquis de Vibraye in the so-called fairy grotto near Arcy, and those of MM. Filhol and Garrigou, in the cave of Maz-d'Azil (Ariège). The former points out three different beds. The lowest, in some spots $1\frac{1}{2}$ metres thick, fills up the inequalities of the ground in the scooped out long and winding grotto, and contains well marked bones of the cave-bear, cave-hyæna, bos priscus, and equus adamiticus. There was also found a human jaw, of the same aspect as the bones of bears. The middle stratum consists of fragments of lime, from the roof and the walls, and are united by a red sandy-clayish cement, as is the case in all osseous breccia of Southern France. In this stratum are chiefly found bones of ruminants, specially of the reindeer in large numbers, horse and ox bones, and flint knives coloured red by the iron oxide of the covering. The uppermost stratum consists of sandy marl, and in aspect resembling löss; contains remains of animals still existing in the country, such as fox, badger, mice, etc. Besides these regular deposits, there were some individual funnel-shaped depressions, manifestly destined for hearths, filled with pieces of coal; lance and arrow heads, made of antlers and bones of deer. These could easily be demarcated from the undisturbed deposits. In the cave of Maz-d'Azel, Filhol and Garrigou also found three superposed strata; the lowest containing bones of the cave-bear and cave-tiger, but no trace of man, excepting perhaps a perforated phalanx of a bear, which was held to be an art product. The middle layer, which was used for road-making before the naturalists became aware of its contents, contained only bones of the large pachydermata. The upper stratum yielded, besides a number of rudely worked reindeer-bones, a large quantity of rude flint implements, evidently produced by percussion.

Observations of this kind, which are but rarely made—for, of all caves hitherto explored, I know, apart from the cave of Lombrive, only of the above—admit of certain inferences as regards the relative chronology of the deposits. In the grotto of Arcy is manifested a definite separation of the epoch of the cave-bear from that of the reindeer. In that of Maz-d'Azil, a bed containing elephant and rhinoceros bones intervenes, the bones of which are, in the other caves, intermixed with those of the bear. This latter observation might, perhaps, offer some basis for the separation of two periods, for the cave-bear and the mammoth; which requires, however, further confirmation, as, from its rarity, it may be looked upon as a local incident caused by peculiar conditions.

As already stated, caves with distinctly separated deposits are ex-

ceptions; whilst such caves as are filled up uninterruptedly within a single epoch form the rule. In the exploration of such caves, we must always keep in view that the filling them is a local phenomenon; that the filling up with the same material (red or dark sand-lehm, with rolled and other flints) may have taken place at very different periods; and that, even in adjoining caves, there may obtain great differences as regards the time of their being filled up. The Belgian caves afford in this respect some valuable hints. Schmerling, who more than forty years ago explored the caves of Liège, found every where the cave-bear in such quantity that its bones and teeth constituted the essential character of the contents. Last year, some Belgian naturalists turned their attention to the caves of the province of Namur, and obtained remarkable results, of which we shall speak presently. But all caves hitherto explored belong to the reindeer period, and only yield the bones of the common brown, and not of the cave-bear; and yet these caves are not so very distant from those of Liège, scarcely sixty miles off. M. Dupont undertook the geological investigation, whilst M. Beneden selected the anatomical determination of the bones. The latter told me, in conversation, that he could not explain it, and must, therefore, ascribe it to accident that Schmerling had only come to such caves the contents of which had repeatedly been disturbed and intermingled by the waters. Possibly this may be so; but I rather am of opinion that the difference arises from this, that, despite the perfect equality of the geological character in both caves—namely, the same aspect of the ossiferous lehm, the same condition of the fissures and the mountains in which they occur (carboniferous and Devonian limestone), and the similar conditions of the valleys and ravines,—I say, despite these resemblances, the filling up of the caves may have taken place at digerent periods.

If this be the case, it follows that we must be exceedingly cautious before drawing general conclusions from the geological character. On finding in any spot mud, sand, lehm with rolled stones, rubble and bones, in a cave beneath a stalactite roof, and, at a distance say of ten, twenty, or fifty miles, other caves with similar contents, we are irresistibly led to generalise, and to assume a general deluge which covered the land above a hundred meters over the present sea-level, and filled up the caves. Having the deluge, no further trouble is necessary. This may satisfy a pious soul, or natural history founded on the Old Testament; but, on closer examination, we find that sand, clay, rolled flints, and scattered bones neither prove flood nor river; and that, assuming even floods and inundations, these may have taken place in limited localities and at different times, consequent on local thunder-storms and rain-spouts. Thus our deluge is reduced to a

number of separate thunder-storms and inundations, which, as at this day, may occur in different localities, and produce there the usual effects of such events. The historian who describes the incursions of the Germans, Huns, Turks, and Cossacks into Europe as a contemporaneous phenomenon, acts like the geologist who looks upon the filling of the ossiferous caves and fissures from the tertiary period to the present epoch as a connected phenomenon. The further we advance in our investigations, the more must we descend to particulars before laying down general conclusions. We must always bear in mind that very different causes may produce the same effects; that cinnabar may be produced by either the dry or humid process; that felspar may, by crystallisation, separate from the water as from a fiery river; that land and marine plants may both give rise to coal-formations; and that caves may be filled either by water-streams, or by slow infiltration, or by means of beasts of prey and man; and that all this may occur at very different periods, and at long intervals. But, unfortunately, we are always led by the deciphering of an individual process to imagine that we have found a magic pass-key which opens all closed doors.

The palæontological character of such caves as present only deposits of one epoch determines, according to the presence or absence of the cave-bear, two well-defined groups, and enables us to pass a judgment. It has been repeatedly pointed out, that the first fauna of the diluvial formations contains already all the types of the wild mammals of Europe; but there are also found in it specimens of extinct or emigrated species. The epochs of the diluvial formation cannot, as may often be done in palæontology, be demarcated by the appearance of certain species, but, on the contrary, only by their disappearance; thus changing the character into a negative one, which can never have the same validity as a positive character. The existence of cave-bear bones thus indicates the time the cave was filled; whilst the absence of such bones can only be looked upon as a relative, not as a positive proof, that the cave has been filled at a later period. But here the contemporaneity of some species may serve to strengthen the proof. Hyæna, tiger, mammoth, rhinoceros, were contemporaries of the cave-bear, and play, in fillings of this kind, an important part; whilst wolf, badger, lynx, but especially sheep, goats, and oxen, in large numbers, are rather more commonly found associated with the reindeer, and but rarely occur in bear-caves.

In Germany we know at present only of bear-caves; occurring also almost exclusively in Central France, although they are not entirely wanting in Languedoc and the Pyrenees. England and Eastern Belgium also have only bear-caves, or those with corresponding contents,

like the hyæna-cave at Kirkdale. In the Southern Alps and the Pyrenees, which do not seem to have been crossed by the cave-bear and his contemporaries, the caves and fissures containing bones of the hippopotamus and the el. meridionalis and antiquus may correspond with the northern bear-caves. As M. d'Archiac and others have observed, the Mediterranean fauna is, from that of the North, during the diluvial formations, much more distinct than at present; so that but few species of mammals, and of these only the smaller ones, not the larger and more important ones, can be named as common to both faunæ.

I know of no fact, excepting the grotto of Maz-d'Azil, which indicates that the mammoth and the fossil rhinoceros have in Central Europe lived later than the cave-bear. As I can in the other characters find no trace of a separation of epochs, the distant periods of the cave-bear and the mammoth, as assumed by Lartet, appear to me to form but one epoch. Of this period we know only the two skulls of Engis and the Neanderthal. The sepulture of Aurignac, which might have given some clue, has, as regards anthropological investigation, been nullified by an unscientific country surgeon. A skull from a Franconian cave, which was formerly preserved in a lumber-room at Munich, admits of doubts regarding its antiquity, as it was not found in the ossiferous soil, but only in the stalagmite. It is useless as an anthropological study, from being, as Professor Oppel told me, covered within and without with a stalactite mass, so as to admit of no measurements. Other remains, such as jaws, teeth, and other bones, have no great claims to be considered as anthropological characters.

In endeavouring, from the discoveries hitherto made, to form conclusions respecting the civilisation of this long-headed (inferring from the Neander skull), powerful, tall, and strong primitive man, who lived by the side of the cave-bear and the mammoth, we perceive that already then he honoured his dead by burying them, probably in a crouching position, in grottoes closed with slabs; and that he furnished them with meat and arms for their journey into another world. He knew the use of fire, and constructed hearths, where he roasted his meat; for of pottery the traces are but few. He broke the long bones of the larger animals in a systematic manner, in order to extract the marrow; and also the skull, to obtain the brain. His implements or weapons consist of rude hatchets and knives, which were struck off from a flint block by another stone; and of worked bones, employed for handles, arrows, clubs, or awls. Such pieces as look like pike or arrow heads never show any grapple-hooks, but smooth sides. This wild primitive man, the wildness of which is indicated by his terrible superciliary arches, nevertheless endeavoured to ornament his person

with perforated pieces of coral and the teeth of wild animals. He probably dressed in skins or prepared bark of trees; for the awls and needles found may have been serviceable for patching together such materials, but not for weaved stuff. We possess no direct information respecting his food, besides that he procured from the chase. The great number of flint instruments found in the caves, since attention has been drawn to this subject, lead us to infer that this man had spread over the whole of Central Europe this side of the Alps: whether in a single or various types, will only be decided when we are in possession of a greater number of skulls.

We shall now pass on to the epoch of the reindeer, the more accurate knowledge and distinction of which may be looked upon as a recent acquisition of science, for which we are chiefly indebted to the indefatigable efforts of M. Lartet. Hitherto this epoch has been only known to us in grottoes and caves, or in a kind of kitchen refuse at Madeleine, in the department of Dordogne. The most eastern locality where reindeer bones, as far as I know, were found, is the Salène, near Geneva; the most northern, the caves in the province of Namur, in Belgium—namely, that of Furfooz, near Dinant. But most reindeer bones have hitherto been found in Central France and in Languedoc. The palæontological character of this period is at present pretty nearly defined. Mammoth and rhinoceros occur very rarely; but the large beasts of prey have disappeared, and been supplanted by the brown bear, the serval, the wolf, the lynx, the iltis, which, however, occur simultaneously with the former. The bison Europæus and the bos primigenius, the cervus elephas and the cervus pyrenaicus, the roe and the reindeer, are found together with the chamois and the ibex, both of which seem to indicate a colder temperature and the advance of the glaciers towards them. Neither are horse and ass, wild hog and hare, mole and field-mouse, altogether absent. No trace, however, of domesticated animals, either of carnivora or herbivora; and the bones of all these animals, which manifestly served man for sustenance, are split in the same manner, and the skulls by the same method, namely, by striking off the horns in the horned animals, as was done in the preceding period.

The grottoes of Eyzies and Langeries-basses, Bruniquel, Massat, Lourdes, Figeae, Bize, and Brengues, mostly situate in the south of France, and those of Furfooz in Belgium, form at present the types of the caves of the reindeer period, showing mostly only a single deposit, sometimes resting upon a bed of rolled flints or coarse sand, which, without satisfactory proof, is considered as corresponding with the period of the cave-bear.

In one only of these grottoes, that of Lourdes in the Pyrenees,

Garrigou and Marten assert to have recognised two strata. The superior stratum, which already had before been explored by Lartet and Alphonse Milne-Edwards, contains many bones of the bison and the aurochs, less of those of the reindeer and horse, but still rather numerous. On the other hand, the bones of lynx, wild hog, stag, chamois, ibex, and a small species of bovidæ, and also mole and field-mouse, goat and sheep, are rare; coals and many worked and chiselled bones, of which presently more have also been found. In the lower level, the bones of which are much older and more decomposed, the reindeer bones were in greater abundance; beside them the bison, horse, stag, a small species of oxen, ibex, a sheep, and two rodents; flint implements of all kinds, but all unpolished; bone instruments, one showing the figure of a fish engraved. The authors of the report conclude, therefore, that the strata belong to separate epochs; the upper one to the period of the aurochs or bison as assumed by Lartet, and the lower to the period of the reindeer. I confess I am unable to perceive any marked distinction. The species of animals in both strata are the same, neither do the objects of art differ; the decomposition of the bones in the lower bed may have been the result of local influences.

We possess from the reindeer period human remains in no inconsiderable number, but mostly only single pieces, phalanges, ribs, long bones, teeth, fragments of crania—of which one from the grotto of Bruniquel is sufficiently large to show that it belonged to a short head. Despite the large number of pieces we possess only four crania apt for measurements; two of the cave of Lembrive, which I have described in my *Lectures*, and two of the grotto of Furfooz, the exact measurement of which I do not possess as yet, but of which I have, by the kindness of M. Dupont, received two fine photographs. The place in which these skulls (figs. 1 to 6) were found is situated about forty mètres above the bed of the river Lesse, and contained besides human bones, some of the brown bear, ox, horse, beaver, gulo, goat, many bird and fish bones, shells of land snails still existing in the vicinity, but especially rein deer bone, some of them worked but without any markings, some were calcined, and intermixed with coals and large pieces of pottery. The human bones form a confused heap; the long bones lie horizontally, many are squeezed between the stones, the cavity of one skull is half filled with stones which can scarcely pass through the occipital foramen. Where water had access the bones are decayed, but otherwise well preserved; more than a half-dozen jaws were found, but only two crania. One cervical vertebra was pressed with such force on the scapula that the coracoid process was broken by it.

The finders conclude from all these circumstances that the cave had been filled up by means of streaming water; to me it appears, without giving my opinion for more than it is worth, that the inhabiting of the cave and slow infiltration must have produced similar effects.

I have before me the photographs of both skulls. They differ much, but still resemble each other by the flatness of the frontal region, and the considerable development of the occiput. The first (Figs. 1, 2, 3, p. 33) is very well preserved, the bones seem lustrous and firm, and look in the photograph almost like a fresh skull. It is a well pronounced shorthead, with a broad base and regularly arched vertex, the frontal line of which seen from above is faintly convex in front. The incisors are perpendicular. If such a skull were found in a South-German grave, it would unhesitatingly be ascribed to the Alemannic tribe, although the slight elevation of the forehead and its flat ascent would indicate "a stupid Suabian." It is different with the second skull (Figs. 4, 5, 6, p. 73). The surface looks carious. There is a gap on the posterior part of the top. The proportion of breadth to length, which in the first may perhaps be 83·100, is here less and amounts to about 80. On viewing it from above, the otherwise broad forehead looks as if transversely cut off, almost with a straight line, the ends of which are received by the process of the zygomatic arch. But what particularly strikes us is the dreadful prognathism so decidedly expressed in the upper jaw deprived of its incisors. The line of the upper jaw forms with the margin of the teeth an angle of only sixty degrees (measured by the photograph), and seems as in simiadæ rather convex, whilst even in the most prognathous Negro it is rather concave. Viewed from behind, the skull appears in the median line roof-shaped, and the parietal planes of the roof almost straight, and consequently, higher than the other skull, and the base narrower in proportion to the height.

Are these differences sufficient for the assumption of a difference of a race, and an intermixture of two different stocks? I hardly think so. Prognathism is here certainly more pronounced and more simious than I have ever seen in any skull; but we know that in eminently orthognathous people, individual instances of this kind occur which may perhaps be looked upon as in favour of Darwin's atavism. Neither is the difference in the frontal line, and in the proportion of height, so very uncommon. But apart from this, the view from the top, with the large breadth diameter so far pushed back, is so similar in both skulls, that I feel inclined to look upon both skulls, despite their difference, as belonging to the same race, until further finds should correct this view, and establish an intermixture of two types.

I have described the skulls of Lembrive in my *Lectures*, to which I

must refer. Their width = 100 : 82 for the child and 100 : 78 for the female, agrees well with that of the Furfooz skull, as well as the straight frontal line and the backward position of the largest breadth diameter. If such conditions manifest a race affinity, which I do not assert, we must, on the other hand, not forget, that the skulls of Lembrive, present by the form of the frontal region, the roundness and arching of the whole calvaria, and by the almost obllterated superciliary arches, a nobler form, a higher development of intelligence, a greater advance towards civilisation, than the skulls of Furfooz. This is the more remarkable, as the industrial character of the reindeer period in France and Belgium agrees with it.*

Dr. Thurnam, in his copious and valuable treatise on old British and Gaulish skulls, which appeared in the first volume of the *Transactions of the London Anthropological Society*, observes, "That there is nothing in the formation of the Lombrive skulls which might induce us to distinguish them from brachycephalous or sub-brachycephalous skulls, which are found in the old Gaulish graves and the round barrows of the old Britons." This comparison seems to be the more correct, since it is unfavourable to Thurnam's view, according to which, the long skulls have in England preceded the short skulls, because the skulls of Lombrive seem at all events older than any skulls found in England either in long or broad barrows. I would, on this occasion observe, that I was rather too hasty in parallelising, as I have done in my *Lectures*, the Lombrive skulls with those of Basques. The investigations of Broca have since that time shown that the Basques were rather dolichocephalic, and that the skulls also differed greatly from the Lombrive crania by the proportion of the frontal to the occipital region.

The final result from these rather scanty facts seems to be, that during the reindeer period a brachycephalic, not very numerous, people of weak osseous structure, inhabited Southern and Central France, and also Belgium.

This people was surrounded by wild animals, which were hunted, and their remains accumulated in and about the habitations, the caves, just as the Greenlanders at Egede's time still accumulated the remains of the consumed animals, so that, as the worthy Bishop says :—

* M. Garrigou, according to a recently published treatise, does not consider the Lombrive skulls as pertaining to the reindeer, but to a more recent epoch. If this be so, we have only the Furfooz skulls as human remains from the reindeer time. This would still better agree with what is stated above. Garrigou, moreover, looks upon these skulls as mongrels of Celto-Iberians and some other people. Such an assertion appears to me to require great courage, when we are engaged in investigations requiring accuracy.

"Every Greenlander inhabits his own charnel house. No trace has hitherto been found of tamed animals. The reindeer, the bison, the horse, furnished most of the food; but carnivora were also consumed, and their bones split for sake of the marrow. Until then there is an almost perfect agreement with the cave-bear period. But we may nevertheless recognise an important advance in civilisation in the mode of working the weapons and implements. Pottery also greatly progresses. Vessels of various kinds are met with, rudely kneaded of clay, intermixed with sand and flints, dried in the sun or hardened on the hearth, and therefore not very fit for cooking or the preservation of liquids; still they are of an agreeable shape, and decorated with lines and drawings, or provided with handles. Then we observe an improvement in the preparation of flint implements. The reindeer men were no longer satisfied with the form of the fragments struck off from the block, but he tried to give it a better shape by further hammering it. The small narrow fragments of the so-called knives are specially noteworthy, as their edges have been worked by numberless short blows, not unlike the so-called beating the scythes."

In the working of bones, especially the antlers of the reindeer, these reindeer men seem to have excelled. Lance and arrow-heads with barbs, knives and daggers, all kinds of flat and curved shapes apt for scraping the skins and similar objects, awls and needles of considerable fineness, with ears fit for the passage of a thread; handles are found in quantity, and some unfinished specimens show the troublesome mode by which these implements were brought to a finished condition.

The art products of the reindeer people who inhabited France are of particular interest. The decorations on many pots and implements consisting of simple, straight, angular, or crossed lines exhibit a certain sense for beauty; but the drawings of animals, as discovered by MM. Lartet and Garrigou, are still more surprising. They are mostly found engraved on bones, but also on slate. Those found by M. Garrigou represent heads and tails of fishes; those in possession of M. Lartet represent large mammals, among which the reindeer is easily recognised by the antlers. Most of these drawings occupy, certainly, merely that rank in art as a schoolboy's attempts on the wall, in order, as a little nephew of mine observed, to derive pleasure from its contemplation. Many of these drawings only furnish us with the idea of horned ruminants in general, leaving to our choice to detect the difference between oxen, sheep, and goats; others, however, are sufficiently characteristic to enable us to recognise the animal at once, although the proportions are somewhat faulty. The masterpiece in Lartet's collection is a handle carved from the antlers of a reindeer, a real sculptured work, the body of the animal being so turned and twisted that it forms a handle for a boy's hand. All other drawings are in sharp and firm

outlines graved upon the surface of the bone, and it may be seen that the artist in working it turned the bone in various directions, some of the lines showing a flat inside turned surface. Many of those drawings are known to the public by the treatises of Lartet and Christy on the caves of Perigord; but I can from my own inspection assert that there exist in that collection many others, and these highly characteristic. Thus I recently saw in my friend Desor's collection two plaster casts of pieces (fig. 7 and 8) found in a heap of bones of the reindeer period, at Madeleine, near Tursac (Dordogne). It is a kind of kitchen-midden at the foot of a rock, about fifteen mètres long, seven mètres broad, and two and a-half mètres thick. In the middle some human remains were found. One of these pieces (fig. 8) is a broken off femur of a swan. The animal carved upon it has a short thick tail, a long straight back and belly, the head and the lower parts of the feet are wanting. A zig-zag line along the back, imitating somewhat rudely the aspect of the reindeer in summer, when the long winter-hair still hangs in flocks about the back, whilst the belly shows already the short dark summer hair. Some short lines before the fore-feet may represent the hair of the throat. The second is a fragment either of a femur or a tibia. It represents two reindeers following each other (?), the one being known by its indication of antlers. Further explorations will, no doubt, increase our treasury of art products of the reindeer period.

The limitation of these art efforts resting upon the observation and imitation of nature as regards time and place is specially remarkable. As regards time, for neither before nor after do we find similar tendencies. For down to the bronze period we only find geometrical figures, lines, angles, triangles, circles, etc., as models of art decoration. With the exception of the object in the collection of Colonel Schwab, in Biel, made of clay, which may represent a bird or some other animal, there has never been found an indication of plaster imitation in the primitive period, including the beginning of the bronze period.

The artistic imitation of nature disappears as suddenly as it appeared, only to reappear at a much later period. Another fact is remarkable as regards local limitation; for it is only in the French reindeer caves that such pieces have hitherto been met with, nowhere else, not even in Belgium, although they have been sought for anxiously. Their occurrence in France is as far as known an isolated fact.

I must here refer to two points, which require further explanation. M. Gervais has, as is well-known, broached the hypothesis founded upon the presence of the reindeer in the south of France, that northern tribes, such as Laplanders and Finns, had emigrated at a very remote period, since, at the arrival of the Greeks and Romans, every trace of them had already disappeared. This view seems to me untenable for

several reasons. First, we consider that the reindeer, as a domestic animal, cannot be thought of separated from the dog, so indispensably requisite for managing the herd. Whoever has seen a reindeer will agree with me that man cannot master even a single couple, much less a herd of reindeer. But hitherto no trace has been found of the domestic dog among the bones of the reindeer period, nor, indeed, of any domestic animals, whilst in the Danish kitchenmiddens the dog occurs, and other domestic animals are met with in the pile-works, which, as shown by Rütimeyer, may, by the texture of their bones, be easily distinguished from those of the wild races. Now if men from the north, who possessed the domestic dog had, with their herds, migrated throughout the European continent, they surely would have brought their dogs with them. The northern and mountain flora which attends the reindeer is another objection against this assumption. Man usually takes with him on his migrating some few animals, and it is in this way that some wild species, especially small mammals, rodents, for instance, have spread over the earth. But that a whole fauna, chamois and ibex, musk-ox and galo, bison and lemming should have immigrated with him, is opposed to all experience. The whole was indigenous, and co-existed with man and the reindeer, just as we find in an insular climate like New Zealand a tropical vegetation almost in contact with glaciers. The condition of the skulls hitherto found also militates against this hypothesis. These skulls agree with those of the Danish stone period only in one point, namely brachycephaly, but deviate from them, as far as I can see in all other essential characters. Even the difference of the habits of the people is against M. Gervais. The stoneman of the Danish kitchenmiddens, the pile-builder, who, as Garrigou has shown, existed also at a later period in France, lives in the low lands, where he erects his habitations in marshes and waters, whilst the reindeer man selects for his habitations caves and inaccessible rocky cliffs. I will, however, attribute not so much importance to this latter point, but as regards the former grounds they seem to prove that we were perfectly justified in not accepting the hypothesis of M. Gervais.

The passage cited above from Thurnam's treatise seems to me, on the contrary, to contain a hint which well deserves consideration. Thurnam has, from his comprehensive and valuable investigations, drawn the inference that long heads are chiefly found in the long barrows, and short heads chiefly in the round barrows, and that in England, at least, the former belong to an older period than the latter. The limits of this paper do not allow me to enter upon the details upon which Thurnam founds his assertion. I cannot, however, omit drawing attention to the fact that, even among the long heads, were found by

Thurnam himself very decided short heads, registered by him as coming from long barrows; and that Thurnam himself admits that the law laid down by him as applicable to England may not apply to the continent. But, admitting that to be so, we cannot easily imagine that such a widely-spread type as the reindeer man should have left no progeny in the intermixture of peoples, and it is very possible that the few short heads occurring in the long barrows of England may have been the first immigrants who, multiplying subsequently, gradually extirpated the original dolichocephalic type of the primitive inhabitants of Great Britain. But, despite this supplantation, the long skulls are not entirely destroyed in England; and Thurnam's tables show that also in the round barrows some dolichocephalic skulls are met with.

It is only after the reindeer period that we come to the later stone-periods of the kitchenmiddens and sepulchres of Denmark, old and more recent pile-works, dolmens, the bronze period, with its attendant progress towards the breeding of domestic animals, grinding of stone weapons, agriculture, and the knowledge of metals. To enter upon these subjects must be reserved for another work for which I collect materials. Here it may be sufficient to have shown that all the characters, the significance and importance of which we endeavoured to point out for the elucidation of primitive times, combine, as regards Central Europe, in the demarcation of two chief periods: the cave-bear epoch, distinguished by large now extinct species of beasts of prey and pachydermata, rude flint implements, coarsely worked bones, and long cranial forms of a strong race of men—and the reindeer period, characterised by the northern fauna of a cold climate, by hammered stone weapons, carved and artfully decorated bones, and the short skulls of a small and more delicately constructed, but, at all events, a very intelligent art-endowed race of men.

*Postscript.*—Professor J. Cocchi, director of the Geological Museum at Florence, has kindly placed at my disposal, besides some Etruscan and Roman skulls, a very old skull (fig. 9 and 10), concerning which he will shortly publish particulars as regards the geological stratum in which it was found. It cannot, of course, be my object to anticipate in any way the observations of my kind colleague. I shall, therefore, merely remark that this relic, the aspect of which alone betrays high antiquity, was found deep under the soil in a bed of bluish-grey plaster clay, containing also, as usual in the Aruv valley, bones of diluvial extinct species of animals, especially of the elephant. Exact details, as regards the bed, will be given in Professor Cocchi's treatise, in which it will be shown that this Florentine skull must, as regards antiquity, be placed by the side of the Engis and Neander skulls, and that, therefore, it is the third skull of the hitherto known oldest period,

but the first found on the surface, and not as a cave deposit, in which, as far as I know, no stone weapons were yet found.

This skull is, unfortunately, not perfect, the cranial portion only being preserved, which is filled with bluish-grey plaster clay. The frontal bone is nearly perfect, wanting only a small piece of the right external canthus. The left parietal is also nearly perfect, whilst the right is badly mutilated. Of the occipital there is only the squama extant, but broken on the right; a piece of the occipital spine is also wanting. It admits of but few measurements and only approximately, as the sutures are rather separated, and many points requisite for measurement are lost.

MEASUREMENTS.

| | Millimètres. | |
|---|---|---|
| Greatest length | 197 | |
| „ breadth | 172 | (Computed from half the width, which can only be measured on the left, and which amounted to 86 *mm.*) |
| Proportion of length to breadth (Indice cephalique) | 100 : 87 | |
| Frontal arc, nasal to coronal suture | 130 | |
| Sagittal suture | 137 | |
| Least frontal breadth | 104 | (Computed from the half.) |
| Distance of the frontal eminences | 61 | |

The skull is consequently large both in length and breadth; the cranial bones are of the usual thickness. The superciliary arches project but little, but present a perceptible depression across the forehead. The frontal protuberances are placed remarkably low—the low forehead proceeds from them almost perpendicularly, and also ascends very flatly towards the vertex, which is situated above the strongly projecting parietal protuberances. The occiput projects considerably backwards, and its lower part is strongly bent inwards.

From these measurements and their comparison, it results that this skull has not the slightest resemblance to the Neanderthal and Engis skulls, except that it shows in the occipital part some likeness to the Neander skull. It as little resembles the Etruscan skulls which I examined in Italy; nor the three skulls of the Bronze period of Elba, which M. Raphael Foresi kindly showed me; nor the Roman and modern Italian skulls.

Prof. Bartolomeo Gastaldi has further placed at my disposal a calvaria in the Valentino museum, which was found near Mezzara Corti in the diluvium of the Po, at a depth of 7 *mètres* 3 *decimètres*, in a bed in which, 3 *mètres* deeper, a splendid skull of the megaceros was met with. The above comparatively small and delicate head belongs to the Ligurian type as distinguished by Niccolucci, and is characterised by a transverse depression of the forehead and of the vertex. The cranium of Mezzana Corti presents the following proportions:—

| | Millimètres. | |
|---|---|---|
| Greatest length ..... | 176 | |
| „ breadth..... | 142 | (Not quite certain, on account of |
| Proportion of the two measuremts. | 100 : 80·4 | imperfect state of one side.) |
| Frontal breadth ..... | 100 | |
| Frontal arc ..... | 128 | |
| Sagittal suture ..... | 122 | |
| Occipital arc..... | 114 | |
| Perpendicular circumference ..... | 364 | |

These measurements agree exactly with the average computed by me from four Ligurian skulls.

I must finally add, that the hope expressed above of further artistic finds of the reindeer period has been fulfilled by the discovery in the grotto of Arcy, by Lartet and Vibraye, of engravings on bones, representing a hairy long-maned elephant, *i.e.* the mammoth. The engraving on ivory, in the possession of M. Lartet, shows so characteristically all the characters of the elephant, as to admit of no doubt that the artist who engraved it must have taken a living mammoth for his model.

## PROCEEDINGS OF THE PARIS ANTHROPOLOGICAL SOCIETY.*

January 19, 1865.—M. Broca presents to the Society several crania found at Maintenon, and in tumuli of Meloisy (Côte-d'Or). M. Martin de Moussy observed that the extraordiuary thickness of cranium No. 2 of Meloisy reminded him of a passage in Herodotus, who relates that after a battle of the Persians with the Egyptians the crania of the latter were found to be very thick compared with those of the Persians, which were thin. Herodotus attributes this to the circumstance that the Persians covered the head whilst the Egyptians were in the habit of going bareheaded in the sun.

M. Pruner-Bey considered this theory as purely imaginary, as the thickness of the skull depended on race. The present Egyptians, who covered the head, possessed crania as thick as their ancestors, whilst modern Hindoos, who expose the head to the burning rays of the sun, had skulls as thin as the Persians, who are of the same race.

*Mummification of the Brain.*—M. Broca presents several cerebral hemispheres mummified for four years, and hard as pasteboard. These brains, the weight and volume of which is considerably reduced, have well preserved their form, and are more suitable for the study of

* Continued from No. XVII, p. 239.

the convolutions than fresh brains. Although the process might be applied to the whole brain it is better to separate the hemispheres in order better to examine the internal surface of the hemispheres. The pia mater being removed, the hemispheres are plunged into a bath composed of five parts water and one part nitric acid. At the end of two days the quantity of acid is doubled; the brains are removed after two days more, when they are found to be sufficiently hard, having lost about one-fourth of their weight. They are then drained on rags, which must be renewed twice or thrice the first day. Next day they are sufficiently dry, so as no longer to wet the fingers; they are then exposed to a current of air on a board in a dry place In a temperature of 20° to 25° cent. The superficial convolutions become brown within five or six days. At the end of twelve or fifteen days the brains are sufficiently solid to yield a sound when struck, nor will they break in falling. They should, however, be exposed to the air for another month, as they exhale acid vapours which stain the linen or paper in which they are wrapped. This process of mummifying is exceedingly simple, requiring little care, and not attended with expense. Brains thus prepared may be carried about in the pocket. They may be sent off without careful packing, and are well adapted for the study of the convolutions. M. Broca thought it would be useful to recommend this process in the general instructions about to be given to travellers, and specially to physicians settled among foreign races. He had tried other processes of mummification, but all have the inconvenience of considerably altering the form of the brain.

M. Pruner-Bey presents an ancient cranium from Sicily sent by M. Furuari, of Palermo, found in the environs of Castelvelrand, province of Trapani; and a cranium of the cavern of Larzac (Avignon).

M. Bonté complained that his paper "On the Classification of the Aryan Races," as it appears in the *Bulletins* of 1864, had been disfigured in an extraordinary manner, and that M. Pruner-Bey had altered some portions of the text, and had omitted several words which rendered the text intelligible. In justification of his assertion, M. Bonté quoted at length many passages of his paper, which had been so altered, and commented upon by M. Pruner-Bey, and contended that his views, as expressed in his dissertation, had not been shaken.

*On the mode by which the Pelvis should be measured.*—M. Alix said that in order that the different diameters of the pelvis, as given by different authors should be comparable, it is necessary that the measurements be taken from identical and well-determined points, which hitherto had not been rigorously pointed out. It might be said that this rigour exists as regards the antero-posterior diameter, called also

sacro-pubic, and the oblique diameters between the ileo-pectineal eminence and the sacro-iliac symphysis. But it is immediately seen that it does not apply to the transverse diameter. All authors say only that this diameter is drawn transversely between the inferior limit of the internal iliac fossa on one side and the inferior limit of the external iliac fossa of the opposite side. But this limit being a line composed of a number of indefinite points, the expression is extremely vague. In order properly to determine the transverse diameter, it is necessary to know the position of its extremities in relation to the following points: the sacro-iliac symphysis, the ileo-pectineal eminence, the anterior and inferior iliac spine, and also the anterior and superior iliac spine. It is impossible to compare measurements of transverse diameters, the position of which has not been determined in relation to at least one of these four points. In order to appreciate the curve of the arch formed by the pubis, the only means is to know the length of the perpendicular drawn from the symphysis pubis upon a transverse line passing through the ileo-pectineal eminences. As regards the antero-posterior diameter, the usual expression is only apparently exact. For the curved line which limits laterally the superior strait, does not always join the superior border of the body of the first sacral vertebra. This line reaches the sacrum in a point which corresponds with the union of the lateral masses of the two first vertebræ of this region. It is continued upon the lateral mass of the first of these vertebræ; but the root of this lateral mass is frequently placed at some distance below the superior border of the vertebral body. It is therefore necessary to say whether the antero-posterior diameter unites the symphysis pubis with the superior border of the vertebral body, or with an inferior border, or with an intermediate point. And so for every oblique diameter parting from the ileo-pectineal eminence to reach the sacro-iliac symphysis, it is useful to designate the precise point of the sacro-iliac symphysis through which it passes, and to say, for instance, whether that is the point which corresponds with the suture of the transverse masses of the two first sacral vertebræ, or whether it be some other point. These observations are not applicable to measurements of the inferior strait, for which most authors give fixed and well-determined points.

M. Lagneau said that the permanent Committee on the ethnography of France, appointed by the Anthropological Society, having met, considered that it would be advantageous to enter into scientific relations with the Archæological and Statistical Societies. The Committee on the ethnography of France is now composed of the following members: for statistics—MM. Boudin, Berlillen, and de Ranse; for archæology—MM. Bertrand, Leguay, and Morpain; for ethno-

graphy and anthropology—MM. Périer, Broca, P. de Remusat, and Lagneau; for geography—M. Barbié du Bocage.

*Description of the Cranium of an Ancient German.* By M. Schaaffhausen; translated by M. Pruner-Bey.—This cranium was found this year near *Nieder-Ingelheim*, associated with stone weapons and pottery mostly unburnt. It seems to belong to ancient Germany. The use of stone weapons and implements did not immediately cease on the introduction of metals; but continued for several centuries after, as proved by documentary evidence. As, nevertheless, Roman civilisation spread on the Rhine at an early period, we must ascribe to this cranium a high antiquity. On clearing a forest of firs near the ancient bed of the Rhine, about twenty-five feet above the present level, and about a mile from the bank, several graves were discovered. Although scarcely any other bones have been collected on account of their fragility, this cranium is nearly complete.* It corresponds to the portrait which, according to the description of Tacitus, we may imagine of the ancient Germans. A similar discovery made near *Lippstadt*, in Westphalia, has been communicated by me to the Society of the Lower Rhine in August, 1859. This cranium, though of an inferior type, has nevertheless nothing of the ignoble. It presents much harmony joined with vigour, and a certain degree of beauty. It resembles the Enghis skull, which has given rise to so many discussions. Still the forehead of the latter has a better conformation; its occipital squama is more prominent, and the summit presents a less ogive form. In both crania, however, the projection of the parietal protuberances gives to the occiput a pentagonal form. The German cranium has a length of 185·5 *mm.*, and a breadth of 135·5 *mm.* That of Enghis is nearly as wide and 8 *mm.* longer, if we deduct from the cast 3 to 4 *mm.* In both crania the greatest width is at the parietal protuberances. After giving a minute description of this skull, M. Schaaffhausen draws attention to certain furrows which are seen ramifying on the surface of the cranium. These he attributed to the action of some acid contained in the roots of vegetables, on the lime of the bones. . . . . The two stone utensils found in the grave are well polished, and, what is rare, the stones belong to the country. The small hatchet is of schist from the Taunus, whilst the other implement, eight inches long, is made of a Greywake schist. One of its surfaces is flat, the other rounded, and one end forms an edged curve. . . . .

M. Broca observed that M. Schaaffhausen's paper raised a question which he had long tried to solve, namely the origin of the innumerable

* Several data lead to the presumption that inhumation was practised by the ancient Germans, as well as cremation.

superficial small grooves found upon bones long buried in the soil. He showed several crania from the graves of Chamant and Mont-Berny, upon which these furrows were well marked. He recollected that about fifteen years ago an observer, whose name he forgot, attributed these grooves to the action of a small insect. He provisionally accepted this explanation, until he found that small filaments of roots were frequently attached to some grooves, when he was led, like M. Schaaffhausen, to assume that the furrows were caused by the action of the roots. He had, however, still doubts on the subject, for the roots left no traces upon the calcareous stones found in the sepulchre of Chamant along with the bones. Now, either the roots act on the bones by pressure, and then they should also erode and furrow the surface of the stones, the hardness of which is inferior to that of the bones, or they acted chemically by their acid, then they should decompose the carbonate of free lime of the chalk.

M. Jouvenal observed that it is not upon the carbonate of lime, but on the phosphate of lime, that the acids of the roots of vegetables acted; many plants, especially the gramineous, absorb in the soil phosphoric acid, and hence acquire the property of decomposing the phosphates. The comparison, therefore, of M. Broca between the furrowed bones and the non-furrowed calcareous stones does not militate against the explanation given by M. Schaaffhausen.

After some further discussion, in which MM. Jouvenal, Sansen, and Broca took part, the meeting adjourned.

April 6, 1865.—*On the Age of Polished Stones in the Caverns of the Ariège, Pyrenees.* By MM. Filhol and Garrigou.—M. Filhol read a memoir on the above subject, of which the following is an abstract:—

"Twelve caverns have furnished to the authors the materials necessary for determining the period. The authors have successively studied the races of animals then existing, the implements fabricated of the bones of these animals, the pottery, and the stone implements which were found in the hearths. With respect to the race of the inhabitants of these caverns, the authors, adopting the views of M. Pruner-Bey, the learned President of the Society, consider them a brachycephalic race, in whom the Turanian face predominates over the Aryan face. This race is allied to the inhabitants of the shores of the Mediterranean and the Swiss lakes. It must, in time, have preceded the Aryan race, since it has left its traces in the deluvium. From the ensemble of the facts, including the same fauna, the identity of habits, industry, and civilisation, the authors are led to conclude that the period corresponds with the age of polished stone and that of the Swiss lake habitations."

M. Bertillon presents to the Society a treatise "On the Mean Duration of Life," which is to be inserted in the *Mémoires*.

April 20, 1865.—The Secretary read a letter from M. de Khanikof, on the relative proportions of the cranial diameters, confirming to some extent the researches of M. Gaussin.

M. Rougou presents to the Society a cranium of the Gallo-Roman period, found at St. German, near Corbeil. It is very dolichocephalic, and presents at the occipital part a well-marked protuberance.

*Crania from Annecy* (*Savoy*).—M. Mortillet, in presenting to the Society four crania from Annecy, said: "There existed formerly in that city a convent of nuns of the order of St. Clara. During the French Revolution, this convent was converted into a manufactory. Some years since, on repairing the church, there were discovered a great number of graves. Happening to be on the spot, I contrived to secure eight crania, all of which presented the brachycephalic form. Seven of these crania belonged to nuns; the eighth cranium belonged to a male, probably to the almoner of the convent. The Convent of St. Clara was a retreat for poor girls, which makes these crania more valuable, as they present the pure type of the country, uninfluenced by intermixture, which always more or less obtains in the higher classes. I have shown these crania to our learned President, M. Pruner-Bey, who will give you the results of his examination."

M. Pruner-Bey accordingly favoured the Society with a detailed account of the anatomical characters of these four crania, and their measurements. These crania, continued M. Pruner-Bey, excepting No. 4, belonged to aged females; they are brachycephalic, and, for female crania, rather voluminous. The whole type differed considerably both from the Aryan and the Negro type. In his opinion, it represented the *Mongol* type of naturalists, or the *Turanian* of linguists. It is, therefore, not astonishing that Finnish, Lap, and Calmuck characters are presented in these crania. . . . There now only remains the question, To what people belonged this cranial type, considered from a geographical, historical, and palæontological standpoint? With respect to the first two points, he would unhesitatingly answer that it is the cranium of the *Ligurians*, which is clearly established by the researches of M. Nicolucci.* History teaches the high antiquity of this race, and anatomy attests the permanence of its type. Piedmont, and specially Savoy, contains amongst its inhabitants numerous representatives of this race. If it be permitted to establish a deduction from cranial characters the same type existed also in France in remote times. Such crania have, in fact, been discovered by the Duke de Luynes in the vicinity of the Uyères. M. Garrigou has found in the caverns of Ariège two faces representing in the nasal parts all the exaggerations of this type. He (M. Pruner-Bey) also had in his own

* *La Stirpe Ligure en Italia ne tempi Antichi e Moderni*, etc. Napoli, 1864.

possession numerous cranial fragments taken from tumuli at Poitou, all denoting the existence of the same type by the side of the Celtic. . . . He (M. Pruner-Bey) did not think he was far out by assigning this cranial type to a period anterior to the polished stone-age, namely to the reindeer epoch. . . . Finally, in order at once to perceive the difference between the Ligurian and the Celtic cranium, it was only necessary to throw a glance at the cranium presented by M. Rougon when placed side by side with the Savoy crania on the table; there is the Celtic type, and here the Ligurian type.

M. Alix defended at great length the late Dr. Gratiolet against the attacks made upon that eminent writer by M. Vogt in his *Lectures on Man*. In conclusion, he requested that such as are about to peruse the works of M. Vogt should not neglect to read also the works of M. Gratiolet, and then they would arrive at the conclusion that not only was M. Gratiolet an elegant writer, but one of the most profound thinkers of our age.

M. de Mortillet observed that although the French edition was published after M. Gratiolet's death, it was ready before that event took place. M. Vogt, before publishing his work, consulted two friends as to the propriety of leaving or expunging certain passages in the preface to the French edition. I, continued M. Mortillet, was one of these two friends, and we both expressed our opinion that M. Vogt need have no scruples on that account. The blame, if any, therefore, partly attaches to us, and I, for my part, am ready to take the responsibility for that advice on my own shoulders.

May 4th, 1865.—M. Broca presents to the Society bones, and marine and freshwater shells which he had extracted from a grotto about two kilomètres from Menton (*Alpes maritimes*), in the territory of Ancient Liguria. This grotto, situate on the sea-shore on the flank of a slope, which is difficult of access, had already been explored to a considerable extent by M. Faurel. It contains a considerable quantity of bones, bearing some analogy to the kitchen refuse of Denmark. These bones are split open, evidently for the sake of the marrow. From the walls was, by means of a hammer, detached a sólid and compact gangue, which contained osseous fragments and shells, also fragments of apparently worked flints. M. Broca was of opinion that this grotto served as a place of refuge where the meals could be dispatched in comparative security.

M. Martin presents, in the name of M. Perier, absent from indisposition, 1, Head of an Egyptian mummy; 2, Head of an Arab, preserved by mercury and solar desiccation; and 3, Fragments of a cranium recently found near the village *Chazay d'Azergues, canton d'Anse* (Rhone).

M. Pruner-Bey, in placing upon the table Dr. Thurnam's treatise "On the two principal forms of Ancient British and Gaulish skulls," said, I ask permission to add a French literal translation of that part of the memoir which interests us most, namely, the craniology of the ancient Gauls and the conclusions arrived at by the author. Having taken an active part in the discussion, I purpose recurring to it when my craniometric tables and my communication on the cranial types of the Ligurians are printed.

M. Alix read a report on a memoir by Dr. Hermann Wagner, "On the measurements of the surface of the cerebrum."

*On the pretended Asiatic origin of Europeans.* By M. Omalius d'Halloy.—The author asked permission once more to return to this subject, inasmuch as his opinions had been partially misrepresented. The discussion to which his questions gave rise proved satisfactory to him from two points of view. In the first place it was recognised, that when the peoples supposed to be Asiatic entered Europe, they found it already inhabited; secondly, no historic documents were produced proving the Asiatic origin of European nations speaking the so-called Aryan languages, and that in favour of such an origin there were only invoked some linguistic, etymological, and mythical considerations. He had not much confidence in the decisions of linguists as regards the filiation of languages. . . . . Had the ancestors of the Europeans known how to write there would probably have been found another language from which our own are derived, so that instead of their being the daughters of the Zend, the granddaughters of the Vedic, and the nieces of the Sanscrit, they would only prove to be very distant relations. . . . . He would add that he was induced to believe that more probably Europeans, still in a barbarian state, had introduced their language into Bactria, were they gradually became sufficiently civilised to write the Vedas, than to assume that civilised peoples of Bactria had entered Europe and lost their civilisation to such a degree that at the time of Tacitus neither the Germans nor Slavonians knew how to write. Another point favourable to his view is the admission that the fair type is not foreign to the Aryans, and he considered that it is more probable that this type, now so abundant in Europe, was developed there. He attached little importance to etymological and mythical relations, as the resemblances are frequently forced. He would also add that the absence of any allusion in European mythologies, to elephants and camels, was counter to the idea of an Asiatic origin. He did not say, as he is represented, that the Asiatics had an European origin. In the present state of our knowledge, we had no certain notion regarding the first distribution of peoples. He merely contended that the so-called *Aryan* language had

been imported into Asia from Europe, which does not necessarily imply that the Persians and Hindoos are of European origin, just as little as it can be pretended that the Spaniards, French, and the Wallachians are of Roman origin because they speak languages imported by the Romans. . . . . To be strictly logical, the name of Europeans should be restricted to peoples of fair complexion; such a pretension would, however, considering the intermixtures that had taken place, lead to absurdities. Anthropological researches, no doubt, have for their object to trace the elements which concurred in the formation of individuals, but an ethnographical classification must accept conditions as we find them. No classification can refuse the name of French to the French-speaking populations of the South and North of France, under the pretext that the Iberian blood predominates in the one and the Teutonic blood in the other branch. . . . . As regards another question, he is of opinion that the languages spoken by the Erso-Kymris are wrongly called Celtic; he believed that the Celts were people with light hair, who vanquished in the West and South of Europe the black-haired peoples. In this he was powerfully supported by Renard and Holzmann, who sustained that the Celts and Germans were identical. It is now pretty generally admitted that the Gaelic and Kymric languages spoken by the Irish, Scotch Highlanders, Welsh and *Bas-Bretons*, are the representatives of languages formerly spoken by the inhabitants of France and the British Isles. But there exists a divergence as regards the relations of these peoples with the Celts, and the natural group to which they belong.

Amedée Thierry and his followers think that the Celts and Gaëls are identical, and that both belong to the black-haired type, and the Kymris, who arrived later, belonged to the light-haired type. He (Omalius d'Halloy), on the contrary, was of opinion, that both the Gaëls and the Kymris were black-haired, and that they were vanquished by the Celts, a people or a confederation of peoples of fair complexion who spoke a Teutonic language. This theory accords better with the facts and historical notions, and disposes of the difficulty of supposing that so powerful a people as the Celts belonged to a family now only feebly represented in the extreme west of Europe. This explains, also, why the Greeks who knew of the conquests of the Celts, called all the Germans by that name.

That which has led to consider the Kymris as belonging to the light-haired type, is the resemblance of their name to that of *Cimbri*, a name given by the Romans to a northern people who, associated with Teutons, penetrated into the South of Europe, whence they were repulsed by Marius, people whom the Romans subsequently found again

in the vicinity of the Baltic. Nothing, however, proves that this people had any relations with the present Kymris, and it may be admitted, with Schayes and other authors, that it was a Germanic tribe, as is shown by their association with the Teutons. Speaking of classification, he would admit that the application of a single character leads to artificial results, and the colouration of the skin is a fugacious and varying character; still, he would sustain, that classifications founded on the colour of the skin, had not yielded such defective results as the cranial classification of Retzius, who placed the Negroes in his first class with the Germans, whilst he rejected the Slavonians from the second class. No member of the Society, he felt convinced, believed that there obtains a closer relation between the Negro and a German, than between a German and a Slavonian.

The most distinctive character of man, concluded M. Omalius, is his aptitude for civilisation, which must be taken into consideration in every classification. Now, it is remarkable that the coloured races have never reached the same degree of civilisation as have the whites, and that among the coloured races the least apt for forming regular states are generally the darkest in complexion. It must not be lost sight of that he spoke merely of *aptitude* for civilisation and not of the *state* of civilisation, which are two different things, the one being a natural character, resulting from organisation, the second resulting from social relations.

M. Liétard said that a complete reply to the interesting paper read by M. Omalius d'Halloy would be to re-open a discussion, which was foreign to his intention; he would, therefore, confine himself to answer a few arguments drawn by the honourable member from the variations in the opinions of scholars relative to the classification and filiation of the Indo-European languages. And first, as regards the Sanscrit. No one now maintains that it is the mother language of Indo-European idioms. This idea is a popular error; the philologist knows that the Sanscrit, Greek, Latin, and other languages, are branches belonging to a common trunk. But what is this common trunk? In this respect there is another error current, namely, that the Vedic Sanscrit, or rather the Vedic language as it is called, is considered as the mother of Indo-European idioms. The truth is, that the language of the Vedas is merely the ancient Sanscrit, so that between the language of the Vedas and the classical Sanscrit there is perhaps less difference than between the French of Rabelais and that of Voltaire. The primitive language of the Aryans, the real ancestor of the Japhetic language, is not represented by any literary document; nevertheless its reconstitution by means of comparative grammar and philology is relatively easy, for it may be obtained by a strict appli-

cation of a series of phenic laws now clearly determined. After the Zend, the filiation of which is now known, we find in chronological order the *Persian*, or the cuneiform inscriptions of Persepolis; then the *Pehlwi*, characterised by numerous expressions borrowed from the Semitic languages; this language became subsequently more Aryan in the *Parsi*, a dialect very poor as regards literary remains, and which, by successive degenerations, became *modern Persian*.

May 18th, 1865.—M. A. Bertrand gave an account of the results obtained from excavations at *Saint-Etienne-au-Temple*, near Chalons, undertaken at the expense of the Emperor. A cemetery was discovered, dating back to at least two or three centuries before our era, in which were found Etruscan pottery, fire-arms, and bronze objects. At some distance were discovered about thirty Gallo-Roman graves. The skeletons were well preserved, and several crania will be submitted to the inspection of the Society.

M. Broca, who, with MM. Bertrand and de Saulcy, had assisted at the excavations of Saint-Etienne, placed upon the table three crania; one a Gallo-Roman, and two Gaulish skulls. Hitherto, said M. Broca, there existed a vexatious blank in the anthropology of France. Our museums and collections contain a certain number of crania of the stone-age and also of the bronze-age, so as to admit of the study of prehistoric types, and also of the crania of the Gallo-Roman period. But, as regards the crania of the *Gaulish* epoch, comprised between the commencement of the iron-age and the subjection of Gaul by the Romans, these were almost unknown, for the crania marked Gaulish in the various collections are partly prehistoric or of an undetermined period. The gap may, perhaps, now be filled up.

A discussion having taken place as to the proper discrimination between the prehistoric, Celtic, and Gaulish periods, M. Broca replied that, in his opinion, the Gaulish period commenced at the time when the Gaulish peoples first came in contact with Italian civilisation, and that it finished with Julius Cæsar.

M. Nicolucci sends four photographs representing two ancient crania of the Ligurian type with a manuscript notice translated and read by M. Pruner-Bey.

The two crania are brachycephalic, and present the Ligurian form, which in prehistoric times must have obtained in the Italian peninsula. The cranium No. 1 seemed to have belonged to an adult man about thirty years of age; No. 2 to a youth of about sixteen years old. Upon the first cranium is very distinctly seen in the frontal suture a peculiarity frequently met with in the ancient crania of the valley of the Pô. There is no trace of disease or artificial deformation in these two crania. Their antero-superior portion is well-developed, and the

forehead is elevated and in harmony with the face and the rest of the cranium. The cranium of the man is orthognathic, that of the youth slightly prognathic, a character very common both in the ancient and modern Ligurian stock. The brachycephaly of No. 2 is remarkable, the cephalic-index reaching 92·60. It is also noteworthy that the antero-posterior diameter is in these crania much shorter than that seen in other ancient crania, whence M. Nicolucci inferred that their brachycephaly depended less on the extension of the transverse diameter than on the shortening of the longitudinal. A table of the principal measurements of these crania is added.

*Instability of Cross-breeds in the Ovine Species.* By M. Sanson.—M. Sanson said that he had often advanced that cross-breeds had no fixity, and after several generations necessarily returned to either of the primitive types which co-operated in forming them. He now had the pleasure to present to the Society aquarells painted from nature representing a certain number of individuals just exhibited at the Agricultural meeting of Versailles. Four of these animals are "Dishley-Merinos." They consequently belong to a pretended fixed cross-breed, and are descended from several generations, the results of crossing between Merino ewes and the English ram of Dishley. A single glance at the drawings shows at once that two of these individuals have returned to the Merino type. The other two have returned to the Dishley type. . . . These facts, he submitted, were of importance also to anthropology, as they may explain many questions relating to the study of human races.

M. Roujou read a paper "On the beds of the polished stone-age near Villeneuve Saint George's."

June 1st, 1865.—*On Dutch Crania*, by M. Sasse of Zaardam (North Holland), translated by M. Pruner-Bey.—Anthropology is threatened by an error which seems to take root, relative to the cranial form of the Dutch, which is deemed to be essentially dolichocephalic. The cause of this seems to be, the comparison which has been established between the Neanderthal skull and that represented by Blumenbach as the cranium of a real Batavian (*Batavi genuini*).

I had the honour of presenting lately to your notice the results of some measurements of crania of North Holland, proving, as regards that province at least, the allegations to be incorrect. Moreover, the cranium delineated by Blumenbach (table lxiii) is exceptional just in those details which should establish the resemblance, namely, the great prominence of the superciliary arches, the recession of the forehead, which is low and flattened. Among the eighty crania of North Holland, there is only one presenting a slight approach to this form.

In the photographs I submit, reduced to one-fourth of the natural

size, you will not find that this type is well marked. Moreover, my celebrated teacher, M. Vrolik, has also published in his catalogue the measurement of five crania from the islands of Marken and Schokland,* and observes that none of these crania resembles the cranium of the *Batavi genuini* represented by Blumenbach. For my part, I stoutly enter my protest against the idea that the Dutch are generally more dolichocephalic than other stocks of Germanic origin, as laid down by M. Vogt in his *Lectures on Man.* As regards the other crania, further researches are unnecessary.

I have taken much interest in the discussion in your Society relative to the Celtic question, which occupies the attention of the learned world. For my part I confess that I am inclined to think with Holzmann and Acker Strating, that the Celts, that is to say the fair-haired Gauls, were nothing but Germans. These nations cannot be distinguished except by language. Moreover, the Celtic language, especially the Kymric branch, presents many points of contact with the low German (Dutch) and low Saxon. Thus I find in Acker Strating, "Adelung (Mithridates) finds that in the Kymric of Wales nearly half the words are low German." Pelletier (*Dict. de la langue Bretonne*) entertains similar views. Finally, the Society for the literature and language of the Netherlands at Leyden possesses two vocabularies by M. Hoefft, on the concordance of Walloon and Low-Breton words with Dutch, Low-Saxon, and Low-German terms.

I cannot pass over the accord of some Welsh customs with those of North Holland. In the *Revue des Deux Mondes*, Feb. 15, 1865, M. Esquiros thus describes the marriage customs of Wales: The same customs, including the "courting in the bed," existed formerly in the Isle of Tessel, under the name of "kweesten," and even now it exists under a somewhat modified form in Holland, north of Amsterdam. The baptism of milk and lime, so dear to the Welsh, exists also as a custom in North Holland, if not generally, at least in the fertile *polders* of Beemster. The lower portion of the walls of houses and of trees is painted white, etc.

It seems to me not to admit of contradiction, that the Germans have crossed the Rhine four or five centuries before our era, and have more or less subjugated the indigenous black-haired population.

* Observation by the translator (Pruner-Bey). "M. Sasse seems to ignore the fine treatise of his countryman M. Lubach, in which the cranial forms are clearly specified according to the provinces of Holland. Anthropologists who have compared the Neanderthal skull with the Batavian cranium of Blumenbach, look upon both as exceptional. It is, therefore, not astonishing that M. Sasse found nothing like it among the eighty modern crania, possibly German, whilst the two preceding should be considered as ancient and Celtic."

They endeavoured to establish themselves as autocrats, or where they were inferior in number to intermix with the natives who have gradually absorbed them. These Germans have imported into Gaul the fair and nomadic element. Had they been long fixed in Germany? This I venture to doubt. Their appearance in Gaul was perhaps only the distant echo of the migratory movements which commenced in Asia in the fourth century before our era, down to the invasion of the Huns. In Greece I am inclined to date the existence of the Aryan element from the Doric invasion. The primitive population of Greece, as regards at least the Ionian, was perhaps Semitic.

I finally venture to suggest that there exists no impassable gulf between us and the Semitics from a linguistic point of view. There are, properly speaking, but two letters which form the root of triliettered Semitic words, etc. If the Society wishes it, I shall be glad to communicate to it my researches on this subject.

M. Pruner-Bey, in mentioning some of the concordances in the words pointed out by M. Sasse, as regards the Semitic and Aryan languages, observed that they presented nothing new and were too vague to be of value. As to the reductibility of Semitic roots, there exist volumes written on this subject by Meyer, Bunsen, Dietrich, etc. All these linguists have, despite their talent, failed in their attempts.

M. Vogt said that he had, it is true, in his *Lectures on Man*, placed the Dutch crania among the dolichocephalic, and that it was chiefly on the opinion of Welcker that he advanced that the Dutch were the most dolichocephalic people of Europe. It is known that the Island of Marken is peopled by a race which is said to be the oldest in Holland, and which does not intermix with the other races. No one at least will contest the extreme dolichocephaly of the inhabitants of this part.

M. Lagneau: Marken and Schokland are two islands of the Zuyder Zee. The first is situated to the south-west of this internal sea, near the coast of North Holland, not far from Monnikendam. It is said that it was only separated from the continent towards the end of the thirteenth century. The inhabitants, generally fair, are said to be industrious, wearing a peculiar dress, and reach an advanced age without being subject to grave diseases (see *Magasin Pittoresque*, p. 137, 1864). The second is situated east of the Zuyder Zee, opposite to the mouth of the Yssel, near the coast of the province of Over-Yssel. The chief village is Middelbuurt.

*Anthropological Study on the Commune (Parish) of Batz (Loire-inférieure), and the Innocuousness of Consanguineous Marriages.* By Dr. A. Voisin. This paper, which is to be published in the *Mémoires* of

the Society, contains the following conclusions:—The parish of Batz is situated in a peninsula surrounded by rocks, and contains a population of about 3,300, who, like the rest of the inhabitants of this department, have little intercourse with adjoining districts. Their intelligence is much developed; all adults can read, and their behaviour is excellent. All the children are suckled by their mothers. The alimentation is good, and chronic diseases rare. At this time there exist in this parish forty-six unions between relations: five between cousin-germans, thirty-one between the issues of cousin-germans, ten between cousins of the fourth degree. Besides these, there is a large number of marriages between cousins of the fifth and sixth degree. The above forty-six marriages have produced one hundred and seventy-four children, twenty-nine of whom died from acute diseases. All the rest are perfectly well, and, like their parents, of excellent constitution. Two unions proved sterile.

"This study," adds the author, "has convinced him that consanguinity is by no means injurious to the offspring, provided the father and the mother present no diathesis, no hereditary taint, are of good health, and live in good hygienic and climateric conditions. In such cases consanguinity, so far from being detrimental to the offspring, on the contrary, exalts the qualities, just as it would tend to perpetuate defects and other causes of degeneration."

M. Dally said that, having lately sojourned for a few days in the island of Brehat (Côtes-du-Nord), he could, from what he saw and heard, confirm the conclusions arrived at by Dr. Voisin.

M. Lagneau then offered some observations on the ethnography of Brehat and Barz, after which the meeting adjourned.

## Correspondence.

### VOGT ON ITALIAN CRANIA.

*To the Editor of the Anthropological Review.*

Sir,—On my return from a voyage, I found on my table the April number of the *Anthropological Review*, containing some strictures which concern me; namely, an article on Italian Anthropology (p. 142) signed J. B. D., and a notice by Dr. H. Wagner (p. 248). I shall first deal with the article, partly written in the name of M. Nicolucci.

I had, as it appears, the misfortune of examining some ancient Italian crania, and to write concerning them a letter to M. Gastaldi, who asked my opinion on a cranium found at Mezzana-Corti, in the alluvium of the Po. This letter is dated January 20, 1866, and relates to observations made in the months of October, November, and De-

cember, 1865. J. B. D. reproaches me for having been too "rash", and for having ignored the labours of previous observers. Now, sir, I confess that I had no intention whatever either to write an article on Italian anthropology, or a treatise on craniological researches made in Italy. My friend Gastaldi asked my opinion on the cranium of Mezzana-Corti, which I gave him, grounded on other data, which I had collected in some other museums. M. Gastaldi then asked my permission to print this letter, which I readily granted. There is no doubt that my letter was written without my possessing any knowledge of the memoirs by Messrs. Garbighetti and Maggiorani, which I have not yet been able to procure. But, what is worse, I had written my letter without having known that of M. Nicolucci on the crania of Marzabotto and Villanova, dated three months before, viz., Sept. 15, 1865. Respecting this last letter, I have to state that Count Gozzadini did not say a word to me, when on the 9th of Dec., 1865, I examined at his house these crania. He even seemed astonished when, after examining them, I told him that, in my opinion, the crania of Marzabotto were not Etruscan skulls. As I was acquainted with some previous researches of M. Nicolucci, I made inquiries after him at Turin, Florence, and Naples; but no one could inform me of his whereabouts, nor did any one tell me of his examination of the crania of Bologna. Certainly, if I had had the least suspicion that he was occupied with this subject, I should have let it alone.

Having premised this much, let us come to the facts. In a letter dated May 26, 1866, a reply to mine, M. Nicolucci takes me to task concerning the Etruscan, Ligurian, and Roman crania. With regard to the first, I gave the measurements of four crania belonging to the museums of Florence and Goettingen (the latter measured by M. His), and of a fifth found in the island of Elba. The mean cephalic index of the first four is 82—the limits of variations between 78·9 and 87; the index of the last is 77·1; the mean index of the five is 80·4. M. Nicolucci, on the contrary, finds, after the examination of many Etruscan crania, the cephalic index to be 76, and that consequently the type is sub-dolichocephalic. M. Nicolucci further says, that my error proceeded from mistaking Ligurian crania for Etruscan crania.

I have since had the curiosity of studying the indications of M. Nicolucci of the numerous Etruscan crania which he has examined. But what was my astonishment, when I found that hitherto M. Nicolucci has compared the crania of Mazabotto with no more than five crania from Perugia, Veie, Tarquinia, and Cere, exactly the same number as mine! Who of us two is right? It is very possible that after the examination of hundreds of Etruscan crania (if we could get them), the mean cephalic index will be quite different. Have we not seen Retzius classing the Germans as dolichocephalous, whilst Welcker proves that they are brachycephalic? But M. Nicolucci says that the Etruscan crania cited by me are not Etruscan. Well, not being an antiquary, I have accepted them as such on the faith of documents and the tickets attached to them. The crania of Goettingen were presented by King Louis of Bavaria to Blumenbach. The crania of

the museum at Florence, came from Volterra and Chiusi. The first was presented by Professor Parlatori, the second by the Marquis Strozzi. If these crania are not Etruscan, so much the worse; but why take me to task? Have at those who presented these crania with false indications. But I doubt much whether M. Nicolucci will undertake this campaign — these crania will therefore remain Etruscan.* M. Nicolucci adds, "M. Vogt also takes as Etruscan some crania found in the necropolis of Marzabetto, near Bologna, which is equally erroneous, as these crania are far removed from them." Now I earnestly protest against such an imputation, and I cannot understand how M. Nicolucci could make it; for I distinctly stated in my letter, that these crania in no way belonged to the Etruscan type, and I placed them in my tables among the crania of the Ligurian type; consequently, J. B. D. veils this unjust imputation of his friend.

I range the crania of Marzabotto among the Ligurian crania, the mean index of which is 81. M. Nicolucci considers them identical with the existing Bolognese, which, according to him, have an index of 78. The only measureable cranium of Marzabotto (the other is deformed artificially) has, according to M. Nicolucci, an index of 79·6; according to my computation, 80·6. It appears to me that the discrimination between the "Ligure" and "Ombrien" types is not easy, and that a single cranium is insufficient for this purpose, especially as the absolute length and width of the Marzabotto cranium agree perfectly with the measurements of Ligurian heads, as may be seen in my table.

I have, moreover, vainly searched in the writings of M. Nicolucci for the proofs demonstrating that the crania of the existing Bolognese and of "the family of the Umbri" essentially differ from the Ligurian type; and when I look upon the delineations of the crania, the photographs and the figures given by M. Nicolucci himself, it appears to me that the difference between Ligurians and Umbrians, is about equal to the differences between "Allemands" and "Germains."

M. Nicolucci also pretends that I am in error by stating "that the majority of existing Italians are brachycephalic." I cannot speak with certainty on this point, not having made the necessary researches. I found this indicated in the table of M. Welcker (*Wachsthum und Bau des menschlichen Schaedels*, p. 57), where, according to the measurements of fifteen crania, the existing Italians are ranged among the brachycephalic by the side of the Turks.

M. Pruner-Bey, after the examination of three crania (*Mém. de la Soc. d'Anthropologie de Paris*, vol. ii, p. 432), gives them an index of 76·6, and places them among the dolichocephali between the Scandinavians and the ancient Romans, the former having the same index, and the latter an index of 77. Who is right, M. Welcker who has

* Here is the copy of the original tickets in the museum of Florence :—

No. 1. "Homo sapiens. Lin. Razza etrusca o Rasena antichi sepolchri etruschi. Chiusi. Domo del Mse. Strozzi 1861."

No. 2. "Testa di antico etrosco dei Sepolchri antichi di Volterra. Dono del Prof. Partatore."

measured fifteen crania, or M. Pruner-Bey who has only measured three crania? Whilst waiting for an exhaustive work on the craniology of the modern Italians, which M. Nicolucci will perhaps some day favour us with, I may I trust be permitted to repeat the assertion of M. Welcker.

Finally, it is the Roman cranium which has given rise to stricture. I have expressed some doubts, nothing more. Blessed are those who believe! At Florence I was shown a brachycephalic head, and told that it was a Roman skull. The crania of Pompeii appeared to me (I could not examine them in detail) brachycephalic. The cranium of Alejus at Goettingen is eminently dolichocephalic (index, 72); those of the crania Britannica (4) are less so (index, 74); those of M. Pruner-Bey (*loc. cit.*, two in number) are still less so (index, 77). I think that doubts are the more permissible as the Romans were generally in the habit of burning their dead, and that exceptions to this rule are cited, as, for instance, if I am not mistaken, as regards the family of the Scipios. M. Nicolucci says that I am mistaken in believing "that the crania of Pompeii may furnish the type of the Roman cranium;" I willingly submit to be condemned on this point. Hitherto I was of opinion that Pompeii was very Roman; if I err, I err, at least, in good company.

One word in conclusion. In a recent treatise by M. Nicolucci (*Sulla Stirpe Sapigica*, Napoli, 1866), a work which I have read with the greatest pleasure, and which appears to me a model of ethnological investigation, M. Nicolucci says expressly (p. 26):—"*Non tacero che fra i teschi greci antichi, come fra i moderni, havvene di quelli si distinguone per la forma brachicefala.*" According to M. Nicolucci the brachycephalic form predominates in the ancient Greeks north of Thessaly, and the dolichocephalic form in the south. Is it then impossible that the ancient Romans should have had two forms, as had the ancient Greeks?

The brachycephalic Greeks were, according to M. Nicolucci, "barbari;" but what were the Romans at first? Nothing but a gathering of all sorts, and at a later period a constantly increasing agglomeration of all possible types. I should have liked to submit to J. B. D. the documents in support of my opinion; but not knowing the address of the writer, I beg to send you the outlines of the crania taken by the apparatus of Lucae on the objects. I have added to these drawings of natural size drawings of two figures of Ligurian crania given by M. Nicolucci himself in his memoir entitled *Popolazioni dell' Italia ne tempi antestorici*, published in 1863 in the first volume of the *Actes de l'Academie de Naples*, in order to compare them with a third drawing of the contours of a fine photograph of the cranium of Mazabotto, which is nearly of the same size. I think that the comparison of these three little figures, cannot but show the near resemblance of their forms. The other drawings are designed as in my letter to M. Gastaldi.

I now come to the complaint of Dr. Hermann Wagner. I admit having committed an error owing to the insufficiency of the text in the comparison of the occipital lobe. I am, however, glad having done so,

for it procured us an autobiography of the professor of natural history at the college of Gotha, of which otherwise we might have been deprived. But, as regards the fact, for which I criticised the elder Wagner, I am perfectly right. It even results from the measurements of M. Wagner the younger, that the occipital lobe in the brain of apes is of the same relative size as in man. I have now the honour of sending to the Society, as well as to some of its members, my memoir *Sur les microcephales ou hommes-singes*, which has just appeared in the memoirs of the *Institut Genevois*, tome 1867, and refer such as take an interest in this question to page 153, and following pages of this memoir, where the whole question is treated at length, and where my assertions are supported by measurements taken on a certain quantity of casts of the brains of men, microcephali, and of apes.

I am, sir, your obedient servant,

Geneva, May 17, 1867. C. VOGT.

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The following letter to ROBERT BRUCE, Esq., Secretary to the Committee for the Reception of Anthropologists at Dundee, tells its own tale :—

MY DEAR SIR,—I have duly received the intimation that you have kindly undertaken the duties of Secretary to a Committee for co-operating with anthropologists during the forthcoming meeting of the British Association at Dundee. I have communicated this gratifying announcement to some of my colleagues who purpose attending, and they have all expressed their appreciation of your sympathy with their labours. We have no right to anticipate difficulties, but at the same time are fully alive to the important services, which, in case of need, you might render to us.

Personally I hail with the greatest pleasure the formation of your Committee, and feel sure that our friends and fellow-workers, to whom I shall not fail to communicate your good intentions towards us, will look forward to their visit to Dundee if only to become better acquainted with such kind friends and sympathisers in all our labours and struggles. I will duly inform you of our arrival at Dundee, which will be, I expect, on Tuesday, the 3rd of September, so far as we can now foresee ; we shall be glad to meet you at such time and place as may be agreeable to you.

In the meanwhile I think it would be advisable that your Committee should confine their efforts solely to bringing together such men as sympathise with our work and are desirous to extend the right hand of fellowship to us ; and that they should in no way attempt to interfere with the legitimate action of the authorities of the Association. Although, I am glad to say, we anticipate no difficulties at the present, we shall all look forward to our visit with increased pleasure from the knowledge that warm friends and allies await us, ready if necessary to do battle under our banner.

Believe me, my dear Sir, very faithfully yours,

JAMES HUNT.

August 8, 1867.

# Anthropological News.

We understand that C. Carter Blake, Esq., F.G.S., etc., late Librarian and Curator to the Anthropological Society of London, and who is well known as as having been intimately connected with that Society from its commencement, has accepted an appointment in connection with the mines in Nicaragua, and will sail early in September for his destination. Mr. Blake may be congratulated on the wide field thus open to him for personal scientific research; and his fellow anthropologists will no doubt receive valuable communications from him relative to the native and mixed inhabitants of the spot he is about to visit, as well as other allied objects of anthropological interest, upon which he will have the opportunity of making original observations in his new sphere of duty. Mr. Blake was, we understand, recently elected an Honorary Fellow of the Anthropological Society of London, in consideration of his zeal and services to anthropological science.

Broca on Anthropology. — The conclusion of M. Broca's admirable article we hope to be able to insert in our next issue.

Sir William Lawrence and Dr. Nott.—Our readers will learn with deep regret the death of these distinguished anthropologists. At the anniversary of the Anthropological Society, we believe that *éloges* will be pronounced on their memory.

Anthropological Society of Spain.—We regret to have to announce that the disturbed state of politics in Spain continues to prevent the meeting of this Society. M. Delgado Jugo still, however, acts with great zeal as Secretary.

Foundation of a Museum of American Archæology and Ethnography, in connection with Harvard University, in the City of Cambridge, Massachusetts.—The munificent Mr. George Peabody, who has presented such very liberal endowments to the poor of the city of London, has with equal generosity contributed to the promotion of science in his own land. He has given 150,000 dollars to found and to maintain a Museum of the Archæology and Ethnography of America. This is excellent news in favour of anthropological science. We rejoice to hear that the distinguished Professor of Anatomy of Harvard University, Dr. Jeffries Wyman, is placed in immediate connection with this new foundation, and is already actively engaged in collecting materials for the new museum. He has lately been in Florida, making explorations in the mounds for crania, antiquities, etc. It is said that Mr. E. G. Squier has contributed to the museum the great collection of ancient Peruvian skulls made by him in his recent researches in Peru.

Discovery of Ancient Human Remains in California.—A human skull has been discovered in the pleistocene of California, in a table mountain, under gravel, volcanic ashes, and lava, along with the bones of the mastodon, extinct horse, tapir, rhinoceros, etc. It is expected the cranium will be sent to the museum of the Academy of Sciences of Philadelphia.

PHOTOGRAPHS OF HUMAN RACES.—A committee of the above Academy has been appointed to obtain photographs of North American Indians, Negroes, and other races. Such objects are of the highest interest and value, if their permanency can be secured; but they can never supersede accurate and truthfully executed *coloured* drawings.

CATALOGUE OF A RUSSIAN COLLECTION OF FOUR HUNDRED HUMAN SKULLS.—The Anthropological Section of the Société des Amis de la Nature, which is in immediate connection with the University of Moscow, has in the press a catalogue of its collection of crania, which extend to four hundred in number. We believe it is nearly ready.

Professor Pott, of Halle, is about to publish vol. i of his Dictionary of the Radicals of the Indo-German Language (*Wurzel-Wörterbuch der Indo-Germanischen Sprache*), which will contain all the class of roots which terminate in vowels. It will be hardly possible to overrate the importance of this long-expected work to all students of language; for no dictionary of reference to the ultimate Aryan source of the words of Indo-European languages in general exists, nor has any philologist ever lived of greater competence to carry out this immense undertaking.

Dr. Adolph Bastian, the anthropologist and traveller, author of "Man in History" (*Der Mensch in der Geschichte*), etc, is at present delivering lectures on Ethnography at Berlin.

NOTICES have appeared in the art criticisms of nearly all the leading journals highly commendatory of Mr. Tweedie's presentation portrait of the Founder and late President of the Anthropological Society, James Hunt, Ph.D., F.S.A., etc. The portrait is now being exhibited at the Manchester Exhibition.

M. DU NOYER has been making some interesting discoveries in the north of Ireland. He has found numerous worked flints in the undisturbed drift sand and gravel of Kilroot, near Carrickfergus. In the space of sixty yards of gravel cutting he extracted twenty-seven of these implements, with a sharpened bone of a bird and a flake of a mammal's bone. He is preparing a notice of this for the Geological Society of Dublin.

BEFORE commencing the completion of his *Principles of Psychology*, Mr. Spencer proposes to prepare a second edition of *First Principles*. The reorganisation and further development of that work will occupy several months. Probably, therefore, it will be nearly the end of the year before the first number of the *Principles of Psychology* is issued. We trust Mr. Spencer will remove the objectionable features from his principles, and thus enable the work to be accepted by men of science.

ANTHROPOLOGY IN THE ISLE OF MAN.—*The Manx Society.*—May 7th, 1867. Dr. Oliver showed the frontal bone of a skull of a large man, which had been taken from the tumulus on the Ballacroak estate in the parish of Malew. He observed that there had been several of those remarkable skulls found, thus showing that there were some very large men at one period in the Isle of Man. His Excellency: A race of giants! The skull was then handed round for the inspection of the members. His Excellency: How much larger would that be than the ordinary head now? Dr. Thomson: I don't think it would be much more than the average. Dr. Oliver said it was a very thick head. Mr. Laughton: They were all thick heads in those days!—(laughter).

His Excellency: It was a very flat head. Dr. Oliver said it was impossible to remove the whole skull, it was in such a state of decomposition. Dr. Oliver observed that there were two tumuli in one field, showing different states of burial—the one Christian and the other Pagan. The larger tumuli contained a quantity of calcined bones, of both men, women, and children, specimens of which he produced; also stone implements of war, including a maul of white quartz, spear-head, flint, and a very perfectly formed stone celt. The tumulus was fifty-one feet long and nine feet high. The stone chamber was perfect in its formation, the lid, which was of granite, weighing between two and three tons. The whole of the joinings of the stone chamber were puddled with clay, and excluded all moisture, so that the interior was perfectly dry. He also exhibited part of a vase from a cairn on Archallagan, which was found filled with calcined bones. There were two of them in the one cairn, enclosed in a kistvaen. He also showed drawings of St. Luke's Chapel, and burial-ground of the Danish Kings Cronk-na-Irey-Lhaa, the Manx Cabbal of the fifth century, the Keeil of the sixth century, and the Treen Church of the eighth century, also drawings the old churches of Kirk Braddan, Kirk German, Kirk Marown, Kirk Malew, and Kirk Conchan.

New South Wales Exhibition Commission.—Acting upon the suggestion of Professor Owen, the Australian Commissioners of the Paris Exhibition of 1867 declared their intention to have the fossil flora and fauna of Australia represented there as extensively as possible. With this view they were desirous of having the osseous breccia of the Wellington caves, and those caves generally carefully examined under the superintendence of a gentleman of adequate scientific knowledge. Mr. Gerard Krefft accordingly examined the caves, and although there for but a very few days, made an interesting collection of fossils. Of these, no less than 1393 specimens have been sent to the Paris Exhibition. They were carefully classified and assorted by that gentleman, and are particularised and described by him in an appendix attached to the New South Wales Catalogue. One, No. 216, is a portion of bone not unlike that of man in structure; and two, Nos. 266 and 267, are stated to be the "posterior part of the fifth metatarsal bone, not unlike the same bone in man." Mr. A. G. De Gyulay, Secretary to the Commissioners, states that no fossil remains, however, have yet been found in those caves which can be declared to be human. But it is to be hoped that Mr. Parkes will act on Professor Owen's suggestion. It is highly desirable for the cause of science that those caves should be thoroughly examined. They might serve to solve one of the great questions of the day, namely, the existence of the remains of man in a fossil state.

Dr. Julius Schvarcz, a Hungarian gentleman of private fortune, and one of the most rising anthropologists of Europe, whose work, published in English, *On the Failure of Geological Attempts in Greece*, received a favourable reception from the scientific world in 1862, has again visited England this season in order to publish the second volume of this work. He has at the same been collecting the most recently acquired facts in relation to the temperature of English and American mines with the view of bringing them forward in his forthcoming extensive work on *Internal Heat*, an abstract of which is to be read at Dundee. Since the year 1862, when Dr. Julius Schvarcz's anthropological and geologico-historical works were for the first time introduced to the English public, he has been continuing his researches into theoretical geology, more particularly in relation to the theory of in-

ternal heat, and has likewise paid much attention to such anthropological subjects as the theory of progressive development, the zoo-geography of the different geological periods, human fossils, and the highest traces of the historical antiquity of human races. At the same time he has been actively engaged in supporting the cause of popular education in Hungary, and has collected at his private expense entirely new tables of school statistics of Hungary, being the most complete and detailed work of the kind in Central Europe. Dr. Schvarcz has, in addition to these scientific and patriotic labours, founded a national association for the promotion of popular education in Hungary, and has brought out, besides a mass of smaller works on educational subjects, a large quarto volume entitled, *Educational Reform as a Political Necessity in Hungary*, a work which is ranked by Hungarian men of science as one of the monumental productions of Hungarian literature; not only in regard to the great influence it has already exercised and continues to exercise on the consolidation of the progress party in Hungary, but also with regard to its form, composition, and style. Dr. Schvarcz, animated by the desire to emulate, with regard to the intellectual development of his countrymen, the work already accomplished for their material interests by the late Count Szechenyi, is looked upon by the mass of the people as well as by the *literati*, as amongst the chief supporters of the national party, although still a young man. A paper by Dr. Schvarcz in relation to his views on national progress in civilisation will be read at Dundee before the British Association. His other paper, on "Internal Heat," may be expected to have great interest for geologists, as it promises to supplant the whole geological doctrine of a central fire by an entirely new argument which we must not forestall. These views, if substantiated, cannot fail to bear in an important manner on various anthropological theories. We shall communicate at a later date the results which Dr. Schvarcz has obtained in his researches into theoretical anthropology, a part of which he has already communicated to the Hungarian Academy of Sciences at Pesth.

Oxford Anthropological Society.—We announce with pleasure the formation of a young and vigorous society for the promotion of our science which has been established at Oxford. Quietly as this little society has arisen, and unostentatiously as it holds on its course—being for the most part composed of the younger members of the university whose taste has led them in a scientific direction—the subjoined list of papers read will appear highly creditable. A paper contributed by a member of this society is prevented only by want of space from appearing in our present number, but we hope to present it to our readers on a future occasion. The following notice will be read with interest:—

"*Oxford Anthropological Society.*—A society has been founded in Oxford for the furtherance of anthropological objects. Mr. A. H. Sayce, Mr. R. Robinson, and Mr. H. G. Sharp having been successively elected Presidents. Since the first meeting of the Society at the beginning of the Easter Term for 1866, the following papers have been read: 'The Influence of Wyclifism on the National Development,' by Mr. C. W. Tait; 'Comparative Mythology,' by Mr. A. H. Sayce; 'The Science of History,' by Mr. A. C. Hamilton; 'Poetry,' by Mr. W. Danks; 'Connexion between the Revolutions of the Moral and the Physical World,' by Mr. A. H. Sayce; 'Education, Ancient and Modern,' by Mr. R. Robinson; 'Law and Equity,' by Mr. J. W. Browne; 'Feudalism,' by Mr. C. W. Tait; 'The Relations of Woman to

Man,' by Mr. C. Churchill; 'The Functions of the Brain,' by Mr. H. G. Sharp; 'Comparison of the English Rebellion and the French Revolution,' by Mr. J. Greenwell; 'The Phenomena of Sleep,' by Mr. C. Babington; 'Greek Civilisation,' by Mr. A. H. Sayce; 'Government,' by Mr. H. Bromley; 'The Principles of War,' by Mr. W. Morris; 'Colonisation,' by Mr. J. Cotton; 'Rent,' by Mr. H. L. Browne; 'Scepticism,' by W. M. Hatch; 'The Relation of Poetry to Philosophy,' by Mr. H. C. James, and 'The Statistics of Crime,' by Mr. C. W. Fowler. Attention has also been drawn to the light hair and complexion of the natives of Oxford and its neighbourhood; characteristics more plainly marked than even in Saxon Somersetshire."

ANTHROPOLOGICAL SOCIETY OF LONDON.—The following appears in the last issue (No. 3) of the *Archiv für Anthropologie*, and will no doubt interest our readers. "This Society, founded in 1863, has, by praiseworthy perseverance, not merely occupied a place by the side of the much older Ethnological Society, but has wrung from the British Association the recognition of anthropology as a special branch of science. The *Transactions* extend over a larger sphere than those of the Paris Society, but have not always the incisive character of the latter. Since last year there has been added to the *Review*, which is critical, and the *Journal* reporting the proceedings of the Society, the *Popular Magazine*, having for its object the popularisation of anthropology. The London Society publishses, like the Paris Society, *Memoirs*, of which the second volume has just appeared. Particularly praiseworthy is the care taken by the London Society to publish the results obtained in other countries. In addition to regular summaries of the proceedings of the Paris Society, the London Society publishes translations of foreign works. Thus, of German works have been translated under the auspices of the Society, — Blumenbach's *Anthropologische Abhandlungen*, Waitz's *Anthropologie der Naturvölker*, C. Vogt's *Vorlesungen über den Menschen*. At the third annual meeting (January 3, 1866) Dr. Hunt, the President, delivered an address on the definition of anthropology and the division of this science. He proposed a new section, to be called archaic anthropology. This part is to embrace all that relates to the physical history of man, whilst historical anthropology should be confined to the psychical history of mankind. Besides these, Dr. Hunt also distinguishes descriptive and comparative anthropology. At the meeting of February 3, a paper by a Mr. Pike gave rise to a lively discussion, which is of special interest to us Germans. Mr. Pike spoke on the psychical characters of the English people.* Mr. Pike rejects the Teutonic descent of the English people, basing his theory chiefly on the fact that the Germans do not box, whilst boxing is a mode of fighting characteristically English. On the other hand he considers that there are a great many resemblances between the ancient Greeks and his countrymen. The Germans are said to be distinguished by a sense for 'wonder!' and they have consequently many words compound with 'wonder,' for instance, 'wunderschoen,' etc. On the contrary, it takes a great deal to make an Englishman wonder at any thing. The English are, besides their great energy, also distinguished by their morality. Even in this respect, thinks the author, the English resemble more the Greeks than the Germans and Frenchmen. In the fine arts, also,

* Appeared in full in the *Memoirs of the Anthropological Society of London*, vol. ii, 1866, p. 153.

and even in music, the Germans are nought, since some of their greatest composers were Jews. Not much is said of the English in relation to art; but at the conclusion attention is drawn to the fact that, 'Whatever their artistic skill may be, the English are certainly great lovers of beauty.' These quotations may be sufficient to give an idea of the author's views. Several members spoke energetically against an exposition both unscientific and presumptuous, whilst another member expressed the hope that the paper would not appear in the publications of the Society. The President, however, did not agree with this suggestion, and the appearance of the paper in the second volume shows that the opponents had to give in. A discussion, very interesting on the whole, took place at the meeting of the 6th of March, on the reading of papers by Messrs. Higgins and Wesley, 'On the Geometric and Perspective Delineations of the Skull.' A Mr. Brookes could, however, not see any advantage in any cranial measurements. At the meeting of the 3rd April, five papers were read on the finds at Caithness, by Cleghorn, Petrie, Anderson, Shearer, and Hunt. We may have to speak of these on another occasion."

Bibliography of Anthropological Literature.—In our next we expect to be able to publish a list of the works and papers published on Anthropology in 1866.

The Moscow Anthropological Society.—We hope to give in our next a *resumé* of the proceedings of this young Society.

Manchester Anthropological Society.—The proceedings of this branch of the Anthropological Society of London will, we believe, appear in the next issue of the Journal of that Society.

On Blood Globules in Fossil Bone.—M. Schaafhausen has recently communicated to the Paris Anthropological Society some interesting observations on the blood globules of fossil bones. "I have the honour," he writes, "of communicating to you a very curious fact, which I have found in my researches concerning the degree of preservation of the microscopic structure of fossil bones. The petrifying substance is mostly carbonate of lime. It is sufficient to remove it by hydrochloric acid to see the laminæ of the osseous tissue pierced by ramifications of osseous cells and canals. But the most interesting fact is the petrifaction of the blood itself. Under the microscope we see red clots in the traversed canals, which, as is known, serve for the distribution of the vessels in the osseous tissue. After the dissolution of the petrifying lime by the acid, the blood corpuscules are perceptible; some of which present their particular form even the bi-concavity. I first observed this fact on the interior surface of a human cranial bone of the Roman period; there was a long reddish tract, which was the petrified blood of a sinus. I recognised a similar fact in a parietal bone belonging to an ancient cranium at the house of Dr. Pruner-Bey; and after microscopic examination our honourable colleague shared my opinion."

An Operation in the Days of the Incas.—M. Broca has presented to the Academy a most remarkable anatomical preparation. It is a skull found in the tomb of the Incas, four miles from the city of Cuzco. M. Broca believes that the skull belonged to an individual who underwent at the same time a fracture and a denudation of the frontal bone. The curious part of it is, that the bone shows traces of having undergone the operation

of trephining. A circular white spot is visible, which shows necrosis of a portion of the bone; and all around it, the rarified tissue has evidently been the seat of an osteitis,the commencement of eliminative action. M. Nélaton has examined the preparation, and calculates that the patient survived the operation about fifteen days. The opening is of a lozenge-shape, and about twelve *millimètres* in diameter. M. Broca thinks that the operation was performed with a gouge.—*British Medical Journal.*

The Spring of Schussen and its most Ancient Inhabitants.—A few years since, this spring, forming a small fish-pond with some trout, and surrounded with thickets of alders, beeches, and firs, with a view over the Tyrolian Alps and the neighbouring Abbey of Schussenried, passed for a picturesque point of Upper Suabia. As elsewhere, the Cloister has become the site of a smelting furnace. A canal of twenty feet in depth has laid dry the pond; but this industrial vandalism, having brought to light a world unknown, the pilgrimages of old times have been replaced by the visits, quite as interesting, of a crowd of savans. On the border of the pond, from fourteen to nineteen feet below a tufaceous and peaty deposit, and above an alluvium of the glacial epoch, lie the witnesses of those times so far remote from us. Excavations extended over twelve square yards of this mud, have exposed quite a *boreal fauna*, mingled with knives, etc., of flint, and antlers of the reindeer. This deposit corresponds exactly with those discovered three years ago by Messrs. Ed. Lartet and Christy, in the Caves of Les Eyzies and of Laugerie, in La Dordogne. Some of the long-bones of the reindeer, from four to five feet, repose there by the side of a jaw-bone of a bear, and crests of the female reindeer, by the side of the perforated skulls of the glutton. It may be seen distinctly that all these animals have been killed by man, who has utilised them for food, as well as for the fabrication of his weapons or utensils. Silex and jasper have principally aided him in this industry. The greater part of the bones buried belong to the reindeer; that domestic inhabitant of the north, which only finds itself at ease under seventy degrees; nevertheless, it is said that the attempt to breed them on the mountains of the Grisons has succeeded. The Greenlanders and the Laplanders use the milk, the flesh, the hair, the intestines, the bladder, and, above all, the antlers of the reindeer. They make of the last spades, spits, spoons, etc.; the ancient inhabitants of Suabia made the same things of them. The fragments of antlers are innumerable, indicating individuals of all ages. The antlers are fractured at their extremities, where they have even been sawed across. The skulls have all been opened, sometimes from the frontal, sometimes from the basal portion. The brain, then, of the reindeer was then a delicacy for the gourmands as at present with the Samoiedes and Ostiaks. No mark of a cutting instrument is ever observed upon the skull, but only those of blows given with stones, sometimes furnished with a handle. Such instruments often lie by their side. Knives of flint served to cut up and flay the reindeer, whilst others were employed to break all the long bones, so as not to lose the marrow from them, with which view not even the bones of the feet were left whole. Only a few of the vertebræ have been observed to be left united together. The effects of fire are still visible, sometimes upon the bones, sometimes upon the hearth-stones; cinders and morsels of charcoal are also present. The absence of teeth is so remarkable, that we may infer with probability that they were employed as ornaments or amulets; only fifteen skeletons have afforded teeth, but half were the remains of

young animals with milk-water so-called. The man then existing knew not the use of metals, and lived after the glacial epoch. When we reflect on the difficulty of procuring instruments by means of flint, we ought to be astonished to find here together five or six hundred specimens. They may be separated into two principal classes. Some have from a few lines to several inches in length, and have served as knives, points of lances, and arrow-heads. A notch at the bottom of the flint-flakes served to attach them to wooden stems, and probably the bowels of the reindeer were used for the purpose. The small points are often as sharp as a lancet, and have but from an inch and a half, to half a line in width. Other stones have the form of saws, or plane irons. The worked flints thus would appear to be derived but in part from the white jurassic limestone, or from the granular deposits of iron of the Wurtemburgh or Bavarian Alps; but the greater part comes from Saxony, from Silesia, from the north of Europe, or even from Champagne, which is difficult to prove exactly. Some red and greenish red jaspers, remind us of certain secondary or cretaceous beds, of the south foot of the Alps (Ainergau, etc.) Nevertheless, if a good many of these objects have necessarily been imported, their conversion into instruments was a local occupation, seeing that the useless fragments of worked flints are still found there. Another occupation was that of converting the reindeer horns into pointed instruments, into shovels, awls, spits, pins, fish-hooks, etc. For that purpose they detached the horns from the skull entirely, or left attached to it a piece of the frontal or occipital bones. They made use for this purpose of pieces of quartz, of silicious schist, or of gneiss, which is still found upon the spot. The antlers were broken off. They cut out pins and awls from the rest of the reindeer horns. This weary labour is demonstrated by the remains of the commencement of like processes. For a half league around worked flints are found in the field. If it be probable that these ancient inhabitants lived about the spring of Schussen, and threw their objects of no value into the neighbouring hollows, it seems that they were ignorant of the potter's art, for no fragment of pottery is observed there, although the dwelling stations of the ancient Germans and Celts always produce them. Flakes of grit, or siliceous schists, were probably used instead, which, seeing that they bear traces of having been in the fire, may well have been employed for cooking or roasting. Human knowledge concentrated itself upon the art of fabricating utensils for the chase and fishing; meanwhile the discovery of very fine iron ochres, seems to indicate that they already employed coloured matters, to embellish the body or the visage. No remains of human bones have yet been discovered there.—J. Jones.

British Association, Dundee.—The *Dundee Advertiser* of August 24th, says: "A considerable degree of alarm has been, and is still, prevalent about the Anthropological section of the British Association, and what may be said and done there. . . . Some jokes, too, good or bad, have been cracked on the subject. Some have called the British the 'Brutish' Association. One lady is said to have remarked, that she could not believe that apes had been turned into men; but she would not have wondered though some men, for their sins, should be turned into apes! Under all this outside cachinnation there runs on, however, a deeper current of vague fear, which we must, if possible, try to modify, if not to check."

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